Launch Activity
Multiplication and Division

SNAPSHOT

Mathematical Standards
- **Preskill:** Explore multiplication of two whole numbers with products from 0 to 144, and related division facts.

Mathematical Practices and Processes
- Model with mathematics.
- Construct arguments and critique reasoning of others.
- Look for and make use of structure.

Learning Goal
Use multiplication and division to solve real world problems.

Language Objective
Students demonstrate to a partner how to solve multiplication and division problems.

MATERIALS
- MathBoard

ACROSS THE GRADES

Before	Grade 4	After
• Students will multiply two whole numbers with products from 0 to 144 and divide using related facts with procedural reliability.	• Students will multiply two whole numbers, up to three digits by up to two digits, with procedural reliability. • Students will divide a whole number up to four digits by a one-digit whole number with procedural reliability. Represent remainders as fractional parts of the divisor.	• Students will multiply multi-digit whole numbers including using a standard algorithm with procedural fluency. • Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders as fractions.

Professional Learning

PROFESSIONAL DEVELOPMENT IN THE CLASSROOM

Formats for Classroom Discourse

Whole-Class Discussions are led by the teacher, who helps the class focus on higher-level concepts, mathematical reasoning, and making sense of new ideas. The teacher should clear up widely held misconceptions and tie past concepts to new thinking.

Small Groups of three to six students discuss ideas for solving the problem as a group and then with the teacher. This is a crucial time for the teacher to look for both conceptual and procedural errors. The teacher challenges group members to explain their strategies, whether correct or incorrect, for solving the problem.

Partners respond to each other's statements so that both partners put their thoughts into words. They practice contributing to the discussion and try to answer each other's questions. The teacher asks for clarification of their thinking and asks directional questions, focusing on identifying and helping the students resolve their own errors.

Social & Emotional Learning

Working with partners and in groups is a key component of learning mathematics. These questions are designed specifically to support learning in a collaborative math classroom.

- Why might they say that? (for students who are struggling, to help them understand correct answers)
- How can you help them out? (for students who are on-target, to help students who are struggling)
- What can you add to what they're saying? (for incomplete answers)
- Do you think their answer is reasonable?
- What can you add to help them? (for incorrect answers)
- How can you repeat what they said using your own words? (to help students consider the reasoning of others)
- Can you reread the problem out loud? (when a student is disengaged, disruptive, or both)

! Common Errors with Multiplication and Division

Within this lesson:
- Students cannot identify compatible numbers.
- Students may not use the correct place value when finding the quotient.

In other lessons with multiplication and division:
- Students do not place a zero in the quotient.
- When dividing, subtraction produces a number that is greater than or equal to the divisor.
- Students may forget to add all of the partial quotients when using models and the Distributive Property to divide.
- Students may multiply by the regrouped number instead of adding it in the regrouping method.

For further information and tips on helping students understand and correct common errors, see individual lessons.

Launch Activity
Multiplication and Division

Introducing Multiplication and Division

This Launch Activity lesson challenges students to use their prior knowledge of multiplication and division to solve problems about area. Students may use a variety of methods to model and solve the problem including basic facts and place value patterns. Students may also rely on counting to check their work. Remind them that the area for growing strawberries must be a rectangle.

Engage Students

Begin by discussing the opening topic. Invite students to participate by sharing what they know about farms or other topics that relate to the lesson, such as farm crops like rice, tree nuts, and sugarcane.

Students show an increased aptitude for learning if they are actively engaged in some part of the subject matter. Questions might include:

• **Have you ever been to a farm?**
• **Have you seen a corn stalk?**
• **What other things are grown on farms?**

Have students work in mixed-ability groups. Give each student a task that they can do well. For instance, in groups of learners with varying abilities, assign each student a specific task, such as leading the group discussion, recording or drawing the work, presenting (but not explaining) the solution, and explaining the models and methods used by the group to solve the problem.

Fascinating Farming

Corn is the most grown crop in the United States. But there are also many other types of crops grown on U.S. farms, such as cotton, soybeans, fruits and vegetables, and wheat. These crops are harvested for use in the U.S. and for export around the world.

Being a farmer is not easy! Extreme weather, pests, and disease can wipe out entire crops. A crop failure in one state is a problem for people around the world who rely on those crop harvests.

The next time you choose a piece of fruit or a vegetable, consider the farmer or farm family who might have grown it. Then consider—would you like to work on a farm?

Farm Facts
• There are about 2 million farms in operation in the United States.
• The average farm size is 444 acres.
• 96% of all U.S. farms are family farms.

ML Three Reads

First, read the story to understand the situation.

Next, read to understand the math.

Then, read to ask what mathematical questions could be asked about the situation.

A small family farm grows corn, cucumbers, strawberries, and tomatoes in an area that is a square. The sides of the square are 10 yards each. The square will be divided by 2 lines into 4 rectangles. Each crop will be grown in its own rectangle.

Launch Activity • Multiplication and Division **73**

ML Three Reads Language Routine

First Read The teacher reads the situation aloud. The students listen to understand the situation.
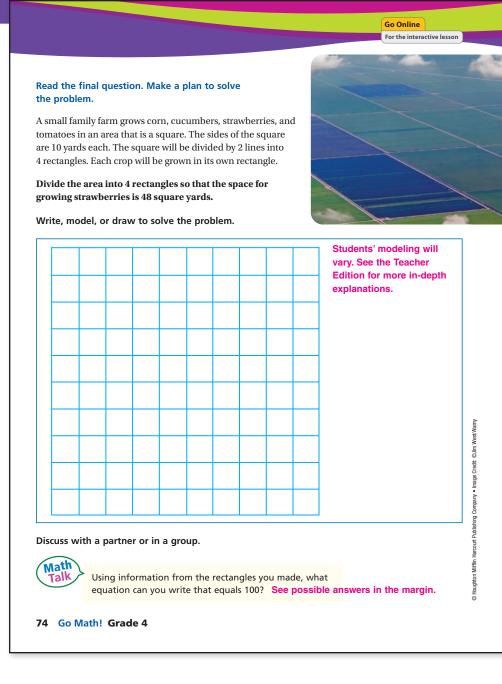
• What is the situation about?
• Can you describe the situation using your own words?

Second Read The students read the situation as a class or with partners. The students read to understand the math.

• What quantities are used in the situation?
• What are the connections between the quantities?

Third Read Each student reads the situation on their own. The student reads to think about possible math problems.

• What mathematical question could you ask about the situation?
• Can this question be answered using the information given?

Read the final question. Make a plan to solve the problem.

A small family farm grows corn, cucumbers, strawberries, and tomatoes in an area that is a square. The sides of the square are 10 yards each. The square will be divided by 2 lines into 4 rectangles. Each crop will be grown in its own rectangle.

Divide the area into 4 rectangles so that the space for growing strawberries is 48 square yards.

Write, model, or draw to solve the problem.

Students' modeling will vary. See the Teacher Edition for more in-depth explanations.

Discuss with a partner or in a group.

Math Talk Using information from the rectangles you made, what equation can you write that equals 100? **See possible answers in the margin.**

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ANSWERS

Main problem: Students should draw a rectangle with an area of 48 square units. They may use a variety of methods such as counting or multiplication and division facts to draw the rectangle.

Math Talk: Possible answer: $48 + 12 + 8 + 32 = 100$

Prompts for Productive Perseverance

For Launch Activity lessons, the exploration of math concepts is more critical than finding a solution. Students should be encouraged to think about new math ideas in an atmosphere that is conducive to learning, with minimal pressure. They learn to solve the problem in different ways and are able to choose the method that works well for them.

What if students can't start working or can't enter into the conversation for this lesson?
Use one or more of these opening prompts:
- *What information do you know about the problem?*
- *Can you draw a picture that represents what you know?*
- *What numbers are in the problem?*
- *What is given in the problem that might help you answer the question?*

How can I help students who are frustrated?
Ask these leading questions:
- *Think about a starting point. How can you enter into this problem?*
- *What information do you have?*
- *What are you working on? What have you done so far?*
- *What comes next? What are you solving for?*
- *What information do you need to get unstuck? Talk to your partner (or group).*

To increase students' understanding of their own thinking, ask:
- *How can you use multiplication and division facts to help you solve the problem?*
- *If the farm was partitioned into 4 equal parts, what would the area of each part be?*

Chapter at a Glance
Multiply by 1-Digit Numbers

	LESSON 3.1 • 1 Day	LESSON 3.2 • 1 Day	LESSON 3.3 • 1 Day
Lesson at a Glance	**Multiplication Comparisons** 77A	**Comparison Problems** 83A	**Multiply Tens, Hundreds, and Thousands** 89A
I Can	I can use models and equations to solve multiplication comparisons.	I can draw models and write equations to help solve comparison problems.	I can use place value and other strategies to multiply tens, hundreds, and thousands.
Learning Goal	Relate multiplication equations and comparison statements.	Solve problems involving multiplicative comparison and additive comparison.	Multiply tens, hundreds, and thousands by whole numbers through 10.
Vocabulary			
Multilingual Support	**Strategy:** Frontload	**Strategy:** Frontload	**Strategy:** Scaffold Language

Practice and Fluency	LESSON 3.1 ◆■ **Practice and Homework** ■ **Waggle** ◆ **Achieving Facts Fluency***	LESSON 3.2 ◆■ **Practice and Homework** ■ **Waggle** ◆ **Achieving Facts Fluency***	LESSON 3.3 ◆■ **Practice and Homework** ■ **Waggle** ◆ **Achieving Facts Fluency***

MTSS RtI **Intervention and Enrichment**	■ **Waggle** ◆■ **Reteach 3.1** ◆■ **Tier 2 Intervention Skill S64** ◆■ **Tier 3 Intervention Skill E64** ◆ **Tabletop Flipchart** ◆ **Enrich 3.1**	■ **Waggle** ◆■ **Reteach 3.2** ◆■ **Tier 2 Intervention Skill S64** ◆■ **Tier 3 Intervention Skill E64** ◆ **Tabletop Flipchart** ◆ **Enrich 3.2**	■ **Waggle** ◆■ **Reteach 3.3** ◆■ **Tier 2 Intervention Skill S67** ◆■ **Tier 3 Intervention Skill E67** ◆ **Tabletop Flipchart** ◆ **Enrich 3.3**

See the Grab-and-Go!™ Centers Kit for more small-group activities.

Grab-and-Go!™
Version 2.0
Differentiated Centers Kit
The kit provides literature, games, and activities for small-group learning.

◆ Print/Printable Resource
■ Interactive Resource

	LESSON 3.4 • 1 Day	**LESSON 3.5 • 1 Day**	**LESSON 3.6 • 1 Day**
Lesson at a Glance	**Estimate Products by 1-Digit Numbers 95A**	**Multiply Using the Distributive Property 101A**	**Multiply Using Expanded Form 107A**
I Can	I can estimate products by rounding and determine if exact answers are reasonable.	I can use models, equations, and the Distributive Property to solve 2-digit by 1-digit multiplication problems.	I can use expanded form to multiply a multi-digit number by a 1-digit number.
Learning Goal	Estimate products by rounding and determine if exact answers to multiplication problems are reasonable.	Use the Distributive Property to multiply a 2-digit number by a 1-digit number.	Use expanded form to multiply a multi-digit number by a 1-digit number.
Vocabulary		area model, Distributive Property, partial product	
Multilingual Support	**Strategy:** Illustrate Understanding	**Strategy:** Identify Relationships	**Strategy:** Frontload

Practice and Fluency

LESSON 3.4	LESSON 3.5	LESSON 3.6
◆ ■ **Practice and Homework**	◆ ■ **Practice and Homework**	◆ ■ **Practice and Homework**
■ **Waggle**	■ **Waggle**	■ **Waggle**
◆ **Achieving Facts Fluency***	◆ **Achieving Facts Fluency***	◆ **Achieving Facts Fluency***

MTSS RtI Intervention and Enrichment

■ **Waggle**	■ **Waggle**	■ **Waggle**
◆ ■ **Reteach 3.4**	◆ ■ **Reteach 3.5**	◆ ■ **Reteach 3.6**
◆ ■ **Tier 2 Intervention Skill S68**	◆ ■ **Tier 2 Intervention Skill S69**	◆ ■ **Tier 2 Intervention Skill S61**
◆ ■ **Tier 3 Intervention Skill E68**	◆ ■ **Tier 3 Intervention Skill E69**	◆ ■ **Tier 3 Intervention Skill E61**
◆ **Tabletop Flipchart**	◆ **Tabletop Flipchart**	◆ **Tabletop Flipchart**
◆ **Enrich 3.4**	◆ **Enrich 3.5**	◆ **Enrich 3.6**

*For individual and class practice with counting automaticity and operational fluency, go to *Achieving Facts Fluency* pages located online.

◆ Print/Printable Resource
■ Interactive Resource

Chapter at a Glance

Multiply by 1-Digit Numbers

	LESSON 3.7 • 1 Day	LESSON 3.8 • 1 Day	LESSON 3.9 • 1 Day
Lesson at a Glance	**Multiply Using Partial Products** 113A	**Multiply Using Mental Math** 119A	**Multi-Step Multiplication Problems**. 125A
I Can	I can use different strategies such as place value and partial products to multiply by a 1-digit number.	I can multiply numbers using mental math and properties of operations.	I can solve real-world problems involving multiplication of whole numbers.
Learning Goal	Use place value and partial products to multiply a multi-digit number by a 1-digit number.	Use mental math and properties to multiply a multi-digit number by a 1-digit number.	Use the *draw a diagram* strategy to solve multi-step problems.
Vocabulary			
Multilingual Support	**Strategy:** Cooperative Grouping	**Strategy:** Scaffold Language	**Strategy:** Frontload

Practice and Fluency	LESSON 3.7 ◆ ■ **Practice and Homework** ■ **Waggle** ◆ **Achieving Facts Fluency***	LESSON 3.8 ◆ ■ **Practice and Homework** ■ **Waggle** ◆ **Achieving Facts Fluency***	LESSON 3.9 ◆ ■ **Practice and Homework** ■ **Waggle** ◆ **Achieving Facts Fluency***
MTSS RtI **Intervention and Enrichment**	■ **Waggle** ◆ ■ **Reteach 3.7** ◆ ■ **Tier 2 Intervention Skill S70** ◆ ■ **Tier 3 Intervention Skill E70** ◆ **Tabletop Flipchart** ◆ **Enrich 3.7**	■ **Waggle** ◆ ■ **Reteach 3.8** ◆ ■ **Tier 2 Intervention Skill S60** ◆ ■ **Tier 3 Intervention Skill E60** ◆ **Enrich 3.8**	■ **Waggle** ◆ ■ **Reteach 3.9** ◆ ■ **Tier 2 Intervention Skill S92** ◆ ■ **Tier 3 Intervention Skill E92** ◆ **Enrich 3.9**

◆ Print/Printable Resource
■ Interactive Resource

	LESSON 3.10 • 1 Day	LESSON 3.11 • 1 Day
Lesson at a Glance	**Multiply 3-Digit and 4-Digit Numbers with Regrouping 131A**	**Solve Multi-Step Problems Using Equations 137A**
I Can	I can multiply whole numbers using estimation, rounding, and place value.	I can solve real-world multi-step problems using multiplication, addition, and subtraction.
Learning Goal	Use regrouping to multiply a multi-digit number by a 1-digit number.	Solve real-world multi-step problems using multiplication, addition, and subtraction.
Vocabulary		
Multilingual Support	**Strategy:** Frontload	**Strategy:** Identify Relationships

Practice and Fluency

LESSON 3.10	LESSON 3.11
◆ ■ **Practice and Homework**	◆ ■ **Practice and Homework**
■ **Waggle**	■ **Waggle**
◆ **Achieving Facts Fluency***	◆ **Achieving Facts Fluency***

MTSS RtI

Intervention and Enrichment

■ **Waggle**	■ **Waggle**
◆ ■ **Reteach 3.10**	◆ ■ **Reteach 3.11**
◆ ■ **Tier 2 Intervention Skill S72**	◆ ■ **Tier 2 Intervention Skill S92**
◆ ■ **Tier 3 Intervention Skill E72**	◆ ■ **Tier 3 Intervention Skill E92**
◆ **Tabletop Flipchart**	◆ **Tabletop Flipchart**
◆ **Enrich 3.10**	◆ **Enrich 3.11**

◆ Print/Printable Resource
■ Interactive Resource

Teaching for Depth
Multiply by 1-Digit Numbers

Using Strategies

Students should be encouraged to use their own strategies as long as they understand the strategy and it makes sense mathematically.

- Students who understand multiplication are flexible in choosing the best strategy.
- Compensation is a particularly useful strategy that makes use of mental math. For example, 9×17, can be thought of as 10×17, with a group of 17 subtracted.
- Students who use this strategy demonstrate a deep understanding and make connections to basic multiplication facts, multiples, and properties of numbers, such as the Distributive Property.

Generalizing Ideas

To promote algebraic reasoning, the focus of math talk needs to shift from sharing strategies to an emphasis on detailing the reasoning around whether a mathematical idea is always true and under what conditions (Franke, Carpenter, & Battey, 2008).

- Studying properties of numbers is one way to build students' ability to generalize.
- As students develop a conceptual understanding of the meaning of multiplication and develop strategies to solve multiplication problems, they will begin to use properties such as the Distributive Property (Schifter, 1999).

From the Research

"As students develop methods to solve multidigit computation problems, they should be encouraged to record and share their methods. As they do so, they can learn from one another, analyze the efficiency and generalizability of various approaches, and try one another's methods.**"** (NCTM, 2000, p. 153)

For more professional learning, go online to Teacher's Corner.

Using an Area Representation

The area model is one representation that research indicates builds student conceptual understanding of two-digit multiplication (Fuson, 2003).

- This model helps students make mathematical connections by making use of place value, expanded notation, number partitioning, basic fact concepts, and the Distributive Property.

	10	7
9	90	63

- The large rectangle can be thought of as 9 rows of 17. The smaller rectangles represent the partial products for multiplying the factors.
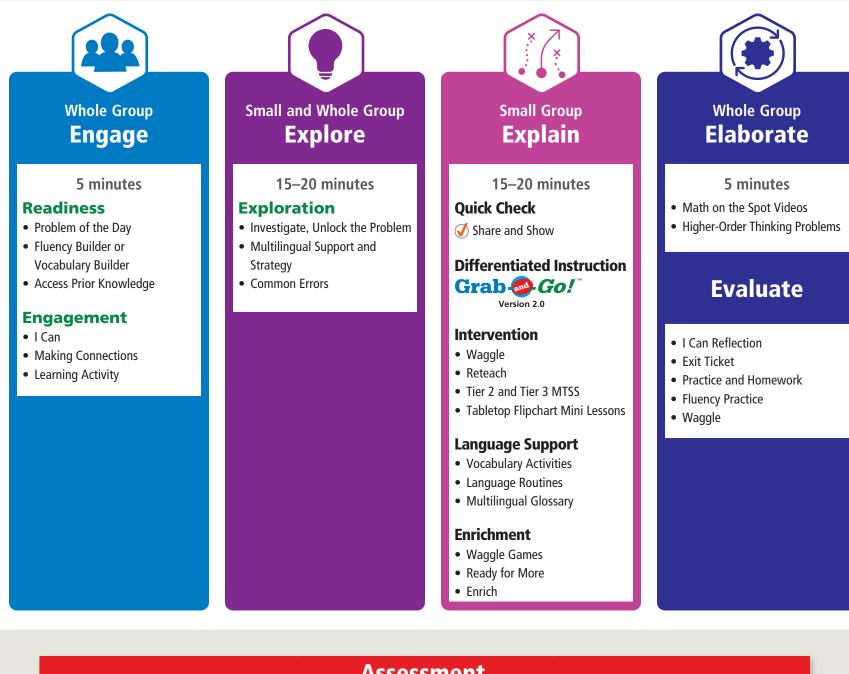
Mathematical Practices and Processes

Construct arguments and critique reasoning of others.

Students should have opportunities to explore different strategies for multiplication. This builds meaning for the operation and contributes to their fluency in the operation. Further, discussing their strategies allows them to share ideas and build more understanding. These experiences help students to use abstract and quantitative reasoning.

Instructional Journey

While every classroom may look a little different, this instructional model provides a framework to organize small-group and whole-group learning for meaningful student learning.

Whole Group
Engage

5 minutes

Readiness
- Problem of the Day
- Fluency Builder or Vocabulary Builder
- Access Prior Knowledge

Engagement
- I Can
- Making Connections
- Learning Activity

Small and Whole Group
Explore

15–20 minutes

Exploration
- Investigate, Unlock the Problem
- Multilingual Support and Strategy
- Common Errors

Small Group
Explain

15–20 minutes

Quick Check
☑ Share and Show

Differentiated Instruction
Grab-and-Go!™
Version 2.0

Intervention
- Waggle
- Reteach
- Tier 2 and Tier 3 MTSS
- Tabletop Flipchart Mini Lessons

Language Support
- Vocabulary Activities
- Language Routines
- Multilingual Glossary

Enrichment
- Waggle Games
- Ready for More
- Enrich

Whole Group
Elaborate

5 minutes

- Math on the Spot Videos
- Higher-Order Thinking Problems

Evaluate

- I Can Reflection
- Exit Ticket
- Practice and Homework
- Fluency Practice
- Waggle

Assessment

Diagnostic	Formative	Summative
• Show What You Know	• Lesson Quick Check	• Chapter Review • Chapter Test • Performance Assessment Task

Grab-and-Go!™
Version 2.0
Differentiated Centers Kit
The kit provides literature, games, and activities for small-group learning.

Strategies for
Multilingual Learners

Assessing your student's understanding of mathematical concepts can be done by listening, speaking, reading, and writing. The level of support a student needs determines how best to assess that student's understanding of mathematical concepts and will help meet the needs of all your students.

Planning for Instruction

Language Support	Substantial (WIDA Level 1)*	Moderate (WIDA Levels 2 & 3)*	Light (WIDA Levels 4 & 5)*
Student's Use of Language	• uses single words • uses common short phrases • heavily relies on visual supports and use of manipulatives	• uses single words • uses some academic vocabulary • relies on visual supports and use of manipulatives	• uses a variety of sentences • uses academic vocabulary • benefits from visual supports and manipulatives
Ways to Assess Understanding	**Listening:** points to pictures, words, or phrases to answer questions **Speaking:** answers *yes/no* questions **Reading:** matches symbols to math terms and concepts **Writing:** draws a visual representation of a problem	**Listening:** matches, categorizes, or sequences information based on visuals **Speaking:** begins to explain reasoning, asks math questions, repeats explanations from peers **Reading:** identifies important information to solve a problem **Writing:** uses simple sentences and visual representations	**Listening:** draws conclusions and makes connections based on what they heard **Speaking:** explains and justifies concepts and solutions **Reading:** understands information in math contexts **Writing:** completes sentences using some academic vocabulary

* For more information on WIDA Standards, visit their website at:
https://wida.wisc.edu/.

ML
• Look for strategies throughout the lesson to support multilingual learners.
• Log on to ED to find additional multilingual activities and Vocabulary Cards.

In This Chapter

Key Academic Vocabulary
Current Development • Vocabulary

area model, **Distributive Property**, **partial product**

Using Language Routines to Develop Understanding

(ML) Language routines provide opportunities for students to develop an understanding of mathematical language and concepts by listening, speaking, reading, and writing. More information on these language routines can be found on the Language Support Cards.

Three Reads

Students read a problem three times with a specific focus each time.

1 What is the situation about?

2 What are the quantities in the situation?

3 What are possible mathematical questions that you could ask for the situation?

Language Support	Substantial (WIDA Level 1)*	Moderate (WIDA Levels 2 & 3)*	Light (WIDA Levels 4 & 5)*
Language Routine Differentiation	Students read a problem three times with a proficient partner with scaffolded questions. **1** What is the problem about? **2** What do each of the numbers describe? **3** What math questions could you ask about the problem?	Students read a problem three times with a proficient partner with scaffolded questions. **1** What is the problem about? **2** What do each of the numbers describe? **3** What math questions could you ask about the problem?	Students engage in the language routine with proficient peers. Monitor to provide additional support if required (*example: clarify meaning of vocabulary within the guiding questions*).
Possible Student Work A bike store rented 200 bikes in April and May. The store rented 300 bikes each month from June through September. How many bikes did the store rent during these months?	Possible Student answers: 1. renting bikes 2. number of bikes 3. How many bikes?	Possible Student answers: 1. A store renting bikes 2. the number of bikes rented 3. How many bikes were rented?	Possible Student answers: 1. A store renting a certain number of bikes a month, 2. 200 bikes in April and in May; 300 bikes each month June through September. 3. How many total bikes did the store rent?

* For more information on WIDA Standards, visit their website at:
https://wida.wisc.edu/.

CHAPTER 3

Assessing Prior Knowledge

Use **Show What You Know** to determine if students need intensive or strategic intervention.

MATH in the Real World

The Arctic Lion's Mane Jellyfish is found only in the cold waters of the Arctic, northern Pacific, and northern Atlantic oceans.

Ask:
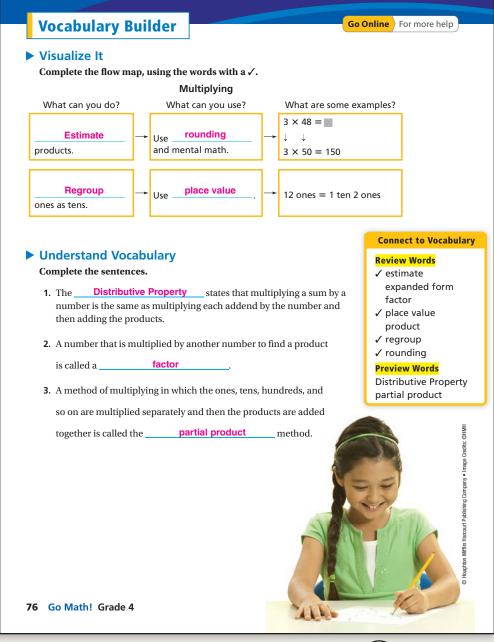
- **What is your height to the nearest foot?** Possible answer: 4 feet
- **How does 120 feet compare to your height? Explain.** Possible explanation: 120 feet is 30 times as long as 4 feet. I thought, "4 times what number equals 120?" To find the answer, I used a basic fact and a pattern. $3 \times 4 = 12$. $30 \times 4 = 120$.

Multiply by 1-Digit Numbers

Name _____

✓ Show What You Know

▶ **Arrays** Write a multiplication sentence for the array.

1. $2 \times 4 = 8$ $4 \times 2 = 8$
2. $3 \times 5 = 15$ $5 \times 3 = 15$

▶ **Multiplication Facts** Find the product.

3. $\underline{54} = 9 \times 6$
4. $\underline{56} = 7 \times 8$
5. $8 \times 4 = \underline{32}$

▶ **Regroup Through Thousands** Regroup. Write the missing numbers.

6. 9 tens 10 ones = $\underline{1}$ hundred
7. 60 hundreds = $\underline{6}$ thousands
8. 25 tens = $\underline{2}$ hundreds 5 tens
9. 14 ones = $\underline{1}$ ten $\underline{4}$ ones
10. 3 tens 12 ones = $\underline{4}$ tens 2 ones

MATH in the Real World

The Arctic Lion's Mane Jellyfish is one of the largest known animals. Its tentacles can be as long as 120 feet. Find how this length compares to your height. Round your height to the nearest foot. 120 feet is _____ times as long as _____ feet.

Possible answers: 30; 4

Chapter 3   75

✓ Show What You Know • Diagnostic Assessment

Use to determine if students need intervention for the chapter's prerequisite skills.

	If NO…then INTERVENE	If YES…then use INDEPENDENT ACTIVITIES

Were students successful with Show What You Know?

	Skill	Missed More Than	Intervene With
TIER 3	Arrays	0	*Intensive Intervention* Skill E59
TIER 2	Multiplication Facts	1	*Strategic Intervention* Skill S62
TIER 2	Regroup Through Thousands	1	*Strategic Intervention* Skill S6

Grab-and-Go!™
Version 2.0

Differentiated Centers Kit

Use the Reteach or Enrich Activities online or the independent activities in the *Grab-and-Go 2.0™ Differentiated Centers Kit.*

Vocabulary Builder

Go Online — For more help

▶ **Visualize It**

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

Multiplying

What can you do?	What can you use?	What are some examples?
Estimate products.	→ Use **rounding** and mental math.	→ $3 \times 48 = \blacksquare$ ↓ ↓ $3 \times 50 = 150$
Regroup ones as tens.	→ Use **place value**.	→ 12 ones = 1 ten 2 ones

▶ **Understand Vocabulary**

Complete the sentences.

1. The _____**Distributive Property**_____ states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.

2. A number that is multiplied by another number to find a product is called a _____**factor**_____.

3. A method of multiplying in which the ones, tens, hundreds, and so on are multiplied separately and then the products are added together is called the _____**partial product**_____ method.

Connect to Vocabulary

Review Words
✓ estimate
expanded form
factor
✓ place value
product
✓ regroup
✓ rounding

Preview Words
Distributive Property
partial product

Vocabulary Builder

Have students complete the activities on this page by working alone or with partners.

▶ **Visualize It**

The flow map organizes several methods of multiplying and shows how to use each one with appropriate examples. Place the word(s) to show "What can you do?" in each box to the left. Follow the arrows and place each method you can use in the next box. Look at the examples in the boxes to the right to help you.

▶ **Understand Vocabulary**
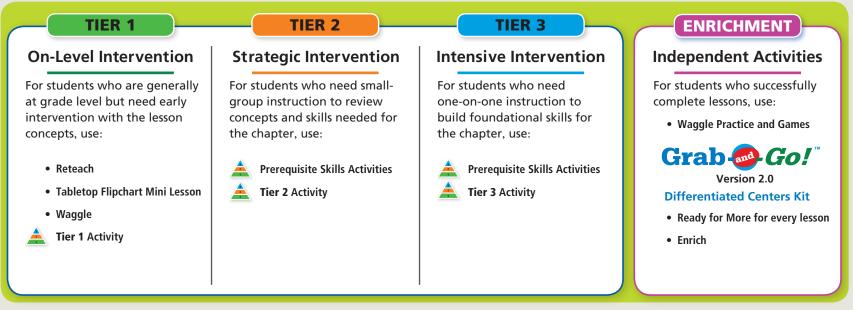
Introduce the new and review words for the chapter.

Students can enhance their understanding of key chapter vocabulary through the use of the VOCABULARY CARDS. Have students cut out the cards and create their own deck of terms. You can use these cards to reinforce knowledge and reading across the content areas.

School-Home Letter is available in English and Spanish online, and in multiple other languages.

Intervention Options MTSS RtI Response to Intervention

Use Show What You Know, Lesson Quick Check, and Assessments to diagnose students' intervention levels.

TIER 1	**TIER 2**	**TIER 3**	**ENRICHMENT**
On-Level Intervention	**Strategic Intervention**	**Intensive Intervention**	**Independent Activities**
For students who are generally at grade level but need early intervention with the lesson concepts, use:	For students who need small-group instruction to review concepts and skills needed for the chapter, use:	For students who need one-on-one instruction to build foundational skills for the chapter, use:	For students who successfully complete lessons, use:
• Reteach • Tabletop Flipchart Mini Lesson • Waggle ▲ **Tier 1 Activity**	▲ **Prerequisite Skills Activities** ▲ **Tier 2 Activity**	▲ **Prerequisite Skills Activities** ▲ **Tier 3 Activity**	• **Waggle Practice and Games** **Grab-and-Go!™** **Version 2.0** **Differentiated Centers Kit** • **Ready for More for every lesson** • **Enrich**

Lesson at a Glance
Multiplication Comparisons

SNAPSHOT

Mathematical Standards

- Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
- Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Mathematical Practices and Processes

- Attend to precision.
- Construct arguments and critique reasoning of others.
- Look for and make use of structure.

(I Can) Objective

I can use models and equations to solve multiplication comparisons.

Learning Goal

Relate multiplication equations and comparison statements.

Language Objective

Students use manipulatives to show and explain how you can model multiplication comparisons.

MATERIALS

- MathBoard

ACROSS THE GRADES

Before	Grade 4	After
Solve one- and two-step real-world problems involving any of four operations with whole numbers.	Solve real-world problems involving multiplication and division of whole numbers including problems in which remainders must be interpreted within the context.	Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context.

ABOUT THE MATH

(MP) Look for and make use of structure.

Mathematically proficient students use models to solve real-world problems. In this lesson, students represent multiplication comparisons using a bar model. Students are given a problem:

Carly has 9 pennies. Jean has 4 times as many pennies as Carly. How many pennies does Jean have?

Students must understand that they are comparing the number of pennies Carly has with the number of pennies Jean has. In the model, a single box with 9 written inside represents Carly's pennies, and 4 same-sized boxes with 9 written inside represent Jean's pennies since he has 4 times as many.

Students then use the model to write and solve an equation: n, the number of pennies Jean has, equals 4 times as many as 9, or $n = 4 \times 9$. So, $n = 36$.

By drawing models and translating between equations and verbal statements, students are able to interpret relationships and solve problems.

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.1

Antonio sees some sea stars at the aquarium. Each sea star has 5 legs. Antonio counts 30 legs in all. How many sea stars does he see? **6 sea stars**

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Materials Digit Cards (1–9)

Mental Math Have pairs practice their multiplication facts. Give partners two sets of digit cards (1–9). Have students shuffle the cards and place them facedown in a single pile on the table. Students take turns turning over two cards and finding the product of the two numbers.

Have students shuffle the cards and play again.

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Review using the Commutative Property of Multiplication as a strategy to find products. Write the following problems on the board in two columns. Have students find the products.

$3 \times 6 = $ ____ **18** $6 \times 3 = $ ____ **18**

$7 \times 8 = $ ____ **56** $8 \times 7 = $ ____ **56**

$9 \times 4 = $ ____ **36** $4 \times 9 = $ ____ **36**

$5 \times 2 = $ ____ **10** $2 \times 5 = $ ____ **10**

- **How can the first problem in the row help you find the product of the second problem in the row?** Possible answer: The factors are the same but in a different order. The Commutative Property states that you can change the order of the factors and the product stays the same, so I can use my first answer as my answer to the second problem.

① Engage

with the Interactive Student Edition

I Can Objective

I can use models and equations to solve multiplication comparisons.

Making Connections

Ask students to think about comparing amounts when one amount is 2 times as many as another.

- **What does it mean if your friend has *2 times as many as* you have?** Possible answer: Two times as many is twice as many or double the number. If I have 4, my friend has 8.

- **What operation would you use in an equation to find 2 times as many?** Possible answer: multiplication; the phrase *two times as many as* indicates that you should multiply by 2.

Learning Activity

Ask the following questions.

- **Suppose you have 3 pencils. Your friend has *4 times as many* pencils as you. How can you find the number of pencils your friend has? Explain.** Possible explanation: the phrase *4 times as many as* indicates that you should multiply by 4. Multiply 4×3.

- **What equation could you write to show the number of pencils in the problem?** Possible answer: $4 \times 3 = n$.

② Explore

Review the bar models, making sure students see that 15 is 3 times as many as 5 and 15 is also 5 times as many as 3.

Unlock the Problem (Real World)

Read and discuss the problem, making sure students understand how the bar model represents the problem and how to use the model to write and solve an equation.

- **What quantities are you comparing?** the number of pennies Carly and Jean have
- **What does the single box next to Carly represent?** Carly's 9 pennies
- **Why are there 4 boxes next to Jean?** Possible answer: Each box represents 9 pennies. Jean has 4 times as many pennies as Carly, so you need 4 boxes.
- **How does the model help you solve the problem?** Possible answer: The model helps me compare the number of pennies Carly and Jean have. I see Jean has 4 times as many pennies as Carly has, or $4 \times 9 = 36$ pennies.

(MP) **Construct arguments and critique reasoning of others.**

Math Talk Use the **Math Talk** to focus on students' understanding of multiplication comparisons.

Students compare additive and multiplicative comparisons.

- **How do you know that the statement "4 is 2 times as many as 2" is a comparison involving multiplication?** Possible answer: because I can write the multiplication equation, $4 = 2 \times 2$, to show the comparison

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Name _____
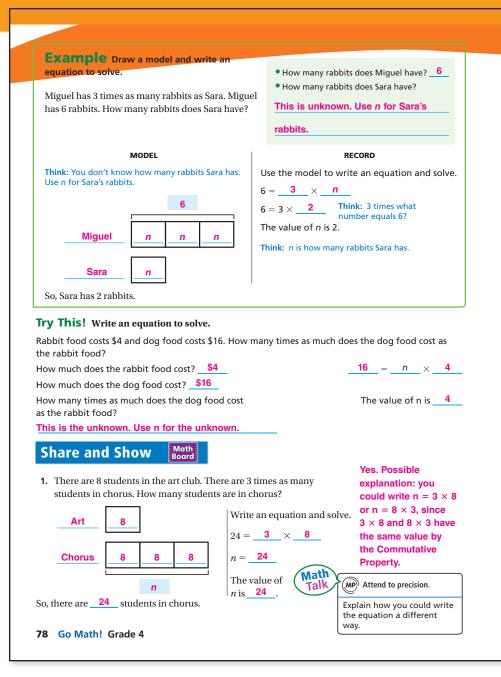
Multiplication Comparisons

(**I Can**) use models and equations to solve multiplication comparisons.

You can use multiplication to compare amounts. For example, you can think of $15 = 3 \times 5$ as a comparison in two ways:

15 is 3 times as many as 5.

15

| 5 | 5 | 5 |

| 5 |

15 is 5 times as many as 3.

15

| 3 | 3 | 3 | 3 | 3 |

| 3 |

> **Remember**
> The Commutative Property states that you can multiply two factors in any order and get the same product.

Math Talk: Possible answer: Carly's pennies are being compared to Jean's pennies. The model shows Carly has 9 pennies, and Jean has 4 times as many as 9 pennies, or 4×9 pennies. Since the total number Jean has is unknown, you can write $n = 4 \times 9$.

▦ UNLOCK the Problem (Real World)

Carly has 9 pennies. Jean has 4 times as many pennies as Carly. How many pennies does Jean have?
Draw a model and write an equation to solve.

- What do you need to compare?

Carly's pennies and Jean's pennies

_____

MODEL

Carly | 9 |

Jean | 9 | 9 | 9 | 9 |

n

So, Jean has __36__ pennies.

RECORD

Use the model to write an equation and solve.

$n = \underline{4} \times \underline{9}$

$n = \underline{36}$

The value of n is 36.

Think: n is how many pennies Jean has.

- Explain how the equation for *4 is 2 more than 2* is different from the equation for *4 is 2 times as many as 2*.

Possible answer: "4 is 2 more than 2" is an additive comparison, so the equation is $4 = 2 + 2$. "4 is 2 times as many as 2" is a multiplicative comparison, so the equation is $4 = 2 \times 2$.

Math Talk

(MP) **Construct arguments and critique reasoning of others.**

Describe what is being compared and explain how the comparison model relates to the equation.

Chapter 3 • Lesson 1   **77**

(ML) ## Multilingual Support

STRATEGY: Frontload

Model how to state a comparison sentence for a multiplication equation.

- Write on the board: $28 = 7 \times 4$.
- Point to each part of the equation as you say *28 is 7 times **as many as** 4*. Have students practice by repeating after you.
- Write other multiplication equations on the board.
- Put students in groups and have them practice saying them.

Example Draw a model and write an equation to solve.

Miguel has 3 times as many rabbits as Sara. Miguel has 6 rabbits. How many rabbits does Sara have?

- How many rabbits does Miguel have? __6__
- How many rabbits does Sara have?

This is unknown. Use *n* for Sara's rabbits.

MODEL

Think: You don't know how many rabbits Sara has. Use *n* for Sara's rabbits.

Miguel | *n* | *n* | *n*

Sara | *n*

So, Sara has 2 rabbits.

RECORD

Use the model to write an equation and solve.

$6 = \underline{3} \times \underline{n}$

$6 = 3 \times \underline{2}$ **Think:** 3 times what number equals 6?

The value of *n* is 2.

Think: *n* is how many rabbits Sara has.

Try This! Write an equation to solve.

Rabbit food costs $4 and dog food costs $16. How many times as much does the dog food cost as the rabbit food?

How much does the rabbit food cost? __$4__

How much does the dog food cost? __$16__

How many times as much does the dog food cost as the rabbit food?

This is the unknown. Use *n* for the unknown.

$\underline{16} = \underline{n} \times \underline{4}$

The value of n is __4__

Share and Show Math Board

1. There are 8 students in the art club. There are 3 times as many students in chorus. How many students are in chorus?

Art | 8

Chorus | 8 | 8 | 8

n

So, there are __24__ students in chorus.

Write an equation and solve.

$24 = \underline{3} \times \underline{8}$

$n = \underline{24}$

The value of *n* is __24__.

Math Talk

MP Attend to precision.

Explain how you could write the equation a different way.

Yes. Possible explanation: you could write n = 3 × 8 or n = 8 × 3, since 3 × 8 and 8 × 3 have the same value by the Commutative Property.

Ready for More | Visual Partners

Materials index cards

- Give each student 3 index cards.

- Have each partner write comparison multiplication problems, such as "Sue has 6 times as many trophies as Bob. Bob has 5 trophies. How many trophies does Sue have?" on each of their index cards.

- Have students trade index cards with their partner. Students draw a model and write and solve an equation for each problem on the back of the index card.

- Partners trade index cards again and check each other's work.

Example

Work through the problem with students. This time the unknown is the lesser quantity in the comparison situation.

- **How can you model how many rabbits Sara has?** Possible answer: Use the single box and write *n* inside to show that the number of rabbits she has is unknown.

- **How can you model how many rabbits Miguel has?** Use the 3 boxes to represent the number of rabbits Miguel has, 6. There are 3 boxes because he has 3 times as many rabbits as Sara. Write *n* inside each box to show the number is unknown.

- **How can you record an equation to represent the model?** Possible answer: 6 is 3 times as many as *n*, or $6 = 3 \times n$.

- **How does this example compare to the Unlock the Problem example on page 39?** Possible answer: In the first example, you were finding the greater quantity being compared. In this example, you are finding the lesser quantity.

Try This!

Translating a comparison sentence into an equation and an equation into a comparison sentence are important skills for understanding and solving real-world problems. Have students explain their thinking.
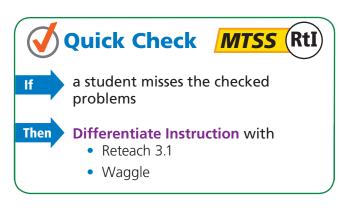
❸ Explain

Share and Show Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

MP Attend to precision.

Math Talk Use **Math Talk** to help students recognize that the multiplication equation can be written in a different way by writing the variable on the right side of the equation.

- **How else could the equation be written so that the value of *n* would be the same?** Write the variable on the right side of the equation as $3 \times 8 = n$

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✓ **Quick Check** **MTSS** (RtI)

If a student misses the checked problems

Then **Differentiate Instruction** with
- Reteach 3.1
- Waggle

(MP) **Attend to precision.**

Have students use Problem 4 to draw and compare models representing $108 = 9 \times 12$ and $108 = 12 \times 9$.
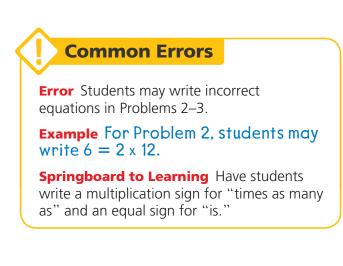
- **Compare the two models. How are they alike? How are they different?** Possible answer: They are alike because both models represent the same product, 108. The models look different. The model for $108 = 9 \times 12$ shows a single box with 12 inside below 9 boxes of the same size with 12 inside. It means 108 is 9 times as many as 12. The model for $108 = 12 \times 9$ shows a single box with 9 inside below 12 boxes of the same size with 9 inside. It means 108 is 12 times as many as 9.

On Your Own

If students complete the checked problems correctly, they may continue with the remaining problems.

(MP) **Construct arguments and critique reasoning of others.**

Problem 10 If students are having difficulty getting started, suggest that they write the equation as a comparison sentence.

⚠ **Common Errors**

Error Students may write incorrect equations in Problems 2–3.

Example For Problem 2, students may write $6 = 2 \times 12$.

Springboard to Learning Have students write a multiplication sign for "times as many as" and an equal sign for "is."

Name _____

Draw a model and write an equation.

2. 6 times as many as 2 is 12.

12
2	2	2	2	2	2

| 2 |

$6 \times 2 = 12$

✓ 3. 20 is 4 times as many as 5.

20
5	5	5	5

| 5 |

$20 = 4 \times 5$

Write a comparison sentence.

4. $108 = 9 \times 12$

108 is **9** times as many as **12**.

✓ 5. $8 \times 4 = 32$

8 times as many as **4** is **32**.

On Your Own

Write a comparison sentence.

6. $5 \times 7 = 35$

5 times as many as **7** is **35**.

7. $99 = 11 \times 9$

99 is **11** times as many as **9**.

8. One week, Alexi and Silvia collected canned goods for a food drive. On Monday, Alexi collected 4 boxes and Silvia collected 2 boxes. At the end of the week, Alexi had 3 times as many boxes as he had on Monday. Silvia had 4 times as many boxes as she had on Monday. Together, how many boxes of canned goods did they have at the end of the week?

20 boxes

9. Cooper has 14 goldfish. Nando has 7 goldfish. Write an equation to show how many times as many goldfish Cooper has than Nando.

$2 \times 7 = 14$

10. (MP) Write a comparison sentence about pet food that could be represented using the equation $12 = 4 \times 3$.

Possible problem: Mr. Campano bought 12 cans of pet food, which is 4 times as many as 3 cans of pet food.

Meeting Individual Needs

Reteach 3.1 **MTSS** (RtI1)

Name _____   LESSON 3.1 Reteach

Multiplication Comparisons

Tara has 3 times as many soccer medals as Greg. Greg has 4 soccer medals. How many soccer medals does Tara have?

Step 1 Draw a model.

Greg ○○○○
Tara ○○○○ ○○○○ ○○○○

Step 2 Use the model to write an equation.

$n = \underline{3} \times \underline{4}$ Think: n is how many soccer medals Tara has.

Step 3 Solve the equation.

$n = \underline{12}$
So, Tara has $\underline{12}$ soccer medals.

Draw a model and write an equation.   Check student's models.

1 4 times as many as 7 is 28.   2 16 is 8 times as many as 2.

$4 \times 7 = 28$ $16 = 8 \times 2$

3 3 times as many as 6 is 18.   4 10 is 2 times as many as 5.

$3 \times 6 = 18$ $10 = 2 \times 5$

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Enrich 3.1

Name _____   LESSON 3.1 Enrich

Multiplication Match-Up

Match each word problem to a model. Write the equation and solve.

1 Angie has 36 coins. This is 4 times as many coins as Scott has. How many coins does Scott have?
A. | n | n | n | n | n | n | n | n | n | | n |
C; $36 = 4 \times n$; $n = 9$

2 Cindy bought 20 stamps. This is 5 times the number of postcards that Yoshi bought. How many postcards did Yoshi buy?
B. | n | n | n | | n |
D; $20 = 5 \times n$; $n = 4$

3 Jessica has 48 stickers. This is 8 times as many stickers as Taylor has. How many stickers does Taylor have?
C. | n | n | n | n | | n |
A; $48 = 8 \times n$; $n = 6$

4 Joshua picked 24 apples. This is 3 times the number of apples that Carly picked. How many apples did Carly pick?
D. | n | n | n | n | n | | n |
B; $24 = 3 \times n$; $n = 8$

5 **Stretch Your Thinking** Write four comparison sentences for the product 12.
Possible answer: 2 times as many as 6 is 12; 6 times as many as 2 is 12; 12 is 3 times as many as 4; 12 is 4 times as many as 3.

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10

11. Luca has 72 baseball cards. Han has 9 baseball cards. How many times as many baseball cards does Luca have as Han has?

a. What do you need to find? <u>I need to find how many</u>

<u>times as many baseball cards Luca has as Han has.</u>

b. How can you use a model to find the number of cards Han has?

<u>I can draw a comparison model.</u>

c. Draw the model.

	72							
Luca	9	9	9	9	9	9	9	9

Han | 9 |
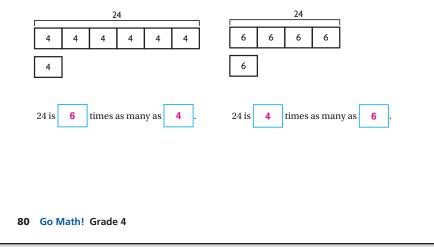
d. Write an equation and solve.

$\underline{72} = \underline{n} \times \underline{9}$

$\underline{n} = \underline{8}$

So, Luca has $\underline{8}$ times as many baseball cards as Han has.

12. Complete the statements to describe each model.

	24					
	4	4	4	4	4	4

| 4 |

	24			
	6	6	6	6

| 6 |

24 is [6] times as many as [4] .   24 is [4] times as many as [6] .

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™

Version 2.0

Differentiated Centers Kit

Tabletop Flipchart

Mini-lessons for reteaching to targeted small groups

Readers

Supports key math skills and concepts in real-world situations.

Games

Reinforce math content and vocabulary

Activities

Meaningful and fun math practice

④ Elaborate

Unlock the Problem Real World

Problem 11 Work through the scaffolded problem with students to help them focus on how to use a model to solve a comparison problem. Direct students to Step c.

- **How can you represent the number of cards Han has in the model?** Since Han has 9 cards, draw one box and write a 9 in it to represent his cards.
- **How can you represent the number of cards Luca has?** Since Luca has 72 cards, draw boxes of the same size and write 9 in each. Draw boxes until they add up to 72 to represent Luca's cards.

Problem 12 This problem assesses students' understanding of multiplication comparisons. Students who cannot correctly interpret the model may not understand what each number represents. Point out to students what each box represents. Explain that the top boxes represent how many "times as many" the boxes on the bottom.

⑤ Evaluate | Formative Assessment

I Can Objective

Have students use manipulatives to show and explain to demonstrate the skill for the I Can statement.

I can use models and equations to solve multiplication comparisons by . . . using a bar model to represent the two quantities being compared. For example, $16 = 2 \times 8$ means 16 is 2 times as many as 8. The model shows a single box with 8 inside below 2 boxes of the same size with 8 inside.

Exit Ticket

Draw a model, and write an equation to represent "4 times as many as 3 is 12." Explain your work.

Practice and Homework

Multiplication Comparisons

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Multiplication Comparisons

Write a comparison sentence.

1. $6 \times 3 = 18$

___6___ times as many as ___3___ is ___18___.

2. $63 = 7 \times 9$

___63___ is ___7___ times as many as ___9___.

3. $5 \times 11 = 55$

___5___ times as many as ___11___ is ___55___.

4. $48 = 8 \times 6$

___48___ is ___8___ times as many as ___6___.

Write an equation.

5. 2 times as many as 8 is 16.

$2 \times 8 = 16$

6. 42 is 6 times as many as 7.

$42 = 6 \times 7$

7. 3 times as many as 5 is 15.

$3 \times 5 = 15$

8. 36 is 12 times as many as 3.

$36 = 12 \times 3$

Problem Solving Real World

9. Metin is 14 years old. Zeki is 7 years old. How many times as old as Zeki is Metin?

2 times

10. There are 27 campers. This is nine times as many as the number of counselors. How many counselors are there?

3 counselors

11. Write Math Draw a model, and write an equation to represent "4 times as many as 3 is 12." Explain your work.

Check students' work.

Chapter 3 • Lesson 1   **81**

Lesson Check

12. Write an equation that represents this comparison sentence.

24 is 4 times as many as 6.

_____ **24 = 4 × 6** _____

_____

13. Write a comparison sentence that represents this equation.

$5 \times 9 = 45$

_____ **Possible answer: 5 times as many as**

9 is 45. _____

Spiral Review

14. Which symbol makes the following statement true?

547,098 $\left(\lt\right)$ 574,908

15. What is the standard form for $200{,}000 + 80{,}000 + 700 + 6$?

_____ **280,706** _____

16. Sean and Leona are playing a computer game. Sean scored 72,491 points. Leona scored 19,326 points more than Sean. How many points did Leona score?

_____ **91,817** _____

17. Rochelle ran 13 miles in one week. She ran 4 more miles than that the following week. How many miles did she run in all?

_____ **30 miles** _____

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance
Comparison Problems

SNAPSHOT

Mathematical Standards

- Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
- Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Mathematical Practices and Processes

- Attend to precision.
- Construct arguments and critique reasoning of others.
- Look for and make use of structure.

(I Can) Objective

I can draw models and write equations to help solve comparison problems.

Learning Goal

Solve problems involving multiplicative comparison and additive comparison.

Language Objective

Students write how a model can help solve a comparison problem.

MATERIALS

- MathBoard

ACROSS THE GRADES

Before	Grade 4	After
Solve one- and two-step real-world problems involving any of four operations with whole numbers.	Solve real-world problems involving multiplication and division of whole numbers including problems in which remainders must be interpreted within the context.	Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context.

ABOUT THE MATH

Why Teach This

In this lesson, students encounter two types of comparison problems: multiplicative comparison and additive comparison. Students learn how to draw bar models and write algebraic equations to solve both types of comparison problems.

In multiplicative comparison, one quantity is a certain number of *times as much* or *times as many as* another quantity.

Additive comparison problems compare a given greater quantity and a given lesser quantity, asking *how much more/how many more or how much less/how many fewer?* In this case, the unknown quantity is the difference between two given quantities.

Students' work with comparison situations helps them identify when to use multiplication or subtraction to solve real-world comparison problems.

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.2

A new sports stadium has 5,900 seats. Elena said that she could rename the number of seats as 4 thousands and some hundreds. How many hundreds does Elena need to write in the name for 5,900? **19 hundreds**

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Multiplication Facts Write the following examples on the board. Have students practice multiplication facts by finding the products and checking answers with a partner.

$3 \times 4 = 12$	$9 \times 5 = 45$	$7 \times 2 = 14$
$5 \times 6 = 30$	$4 \times 10 = 40$	$8 \times 7 = 56$
$2 \times 3 = 6$	$1 \times 9 = 9$	$6 \times 8 = 48$
$8 \times 1 = 8$	$3 \times 6 = 18$	$9 \times 9 = 81$

FOCUSING ON THE WHOLE STUDENT
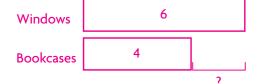
Access Prior Knowledge

Discuss real-world comparison problems that involve multiplication or subtraction. Review the related bar models.

- **How many more windows than bookcases are in our classroom?**

Have students explain how they found the answer. Then show how to draw a bar model to represent and solve the problem. **Possible drawing given**.

Windows	6
Bookcases	4	?

$6 - 4 = 2$; 2 more windows than bookcases

💬 Social & Emotional Learning

Responsible Decision-Making During with students the importance of making decisions independently. There are times when you work on your own and you must make decisions. *What can you do to feel confident in making a decision? Do you think about what you know that can be useful in making the decision? Can you compare it to other times when you have made a decision? Working on your own and making decisions independently can be empowering and show that you are confident in your knowledge and skills.*

❶ Engage

with the Interactive Student Edition

I Can Objective

I can draw models and write equations to help solve comparison problems.

Making Connections

Ask students to tell you what they know about multiplication comparisons.

- **What does the equation $24 = 3 \times 8$ tell you about how 24 relates to 3 and 8?** Possible answer: 24 is 3 times as many as 8.

- **What phrase in a comparison sentence suggests a multiplication comparison? an addition comparison?** Possible answer: *5 times as many as* suggests multiplication. 5 more than suggests addition.

Learning Activity

Ask the following question.

- **How would you draw a model to represent this problem? Ken has $5. Mark has *3 times as much* money as Ken. How much money does Mark have?** Check students' models; Mark has $15.

- **How can you find the total amount both boys have?** Possible answer: Add the two amounts: $5 + $15 = $20.

2 Explore

Unlock the Problem Real World

Have a volunteer read the problem aloud.

Example 1

Discuss the bar model.

- **Why are there 7 boxes for the weight of Evan's dog?** Evan's dog weighs 7 times as much as Oxana's dog, and 7 boxes shows 7 times as much as 1 box.

- **What does the letter *n* stand for?** the unknown weight of Oxana's dog

(MP) **Attend to precision.**

In Step 2, make sure students understand that they should write an equation to match the bar model.

- **Where does the number 8 come from in the multiplication equation?** There are 8 boxes in the model: 7 boxes for Evan's dog and 1 box for Oxana's dog. All of the boxes make up 8 equal groups that make up the total weight, 72 pounds.

Discuss the idea that this problem involves multiplication comparison.
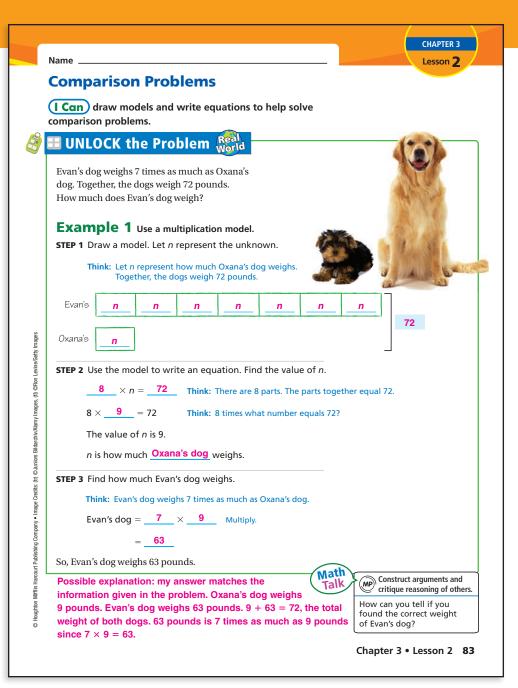
- **What are you comparing in this problem?** Possible answer: the weight of Evan's dog to the weight of Oxana's dog

- **Why is multiplication used to solve this problem?** Possible answer: the problem says that one dog weighs "7 times as much as" the other dog.

(MP) **Construct arguments and critique reasoning of others.**

Math Talk Use **Math Talk** to check that students' answers match the information given in the problem.

- **If your answer is correct, what two facts must be true?** The weight of Evan's dog is 7 times the weight of Oxana's dog. The total weight of Evan's dog and Oxana's dog is 72 pounds.

Name _____

Comparison Problems

(I Can) draw models and write equations to help solve comparison problems.

⊞ UNLOCK the Problem Real World

Evan's dog weighs 7 times as much as Oxana's dog. Together, the dogs weigh 72 pounds. How much does Evan's dog weigh?

Example 1 Use a multiplication model.

STEP 1 Draw a model. Let *n* represent the unknown.

> **Think:** Let *n* represent how much Oxana's dog weighs. Together, the dogs weigh 72 pounds.

Evan's | *n* | *n* | *n* | *n* | *n* | *n* | *n* | } 72

Oxana's | *n* |

STEP 2 Use the model to write an equation. Find the value of *n*.

$\underline{8} \times n = \underline{72}$ **Think:** There are 8 parts. The parts together equal 72.

$8 \times \underline{9} = 72$ **Think:** 8 times what number equals 72?

The value of *n* is 9.

n is how much **Oxana's dog** weighs.

STEP 3 Find how much Evan's dog weighs.

> **Think:** Evan's dog weighs 7 times as much as Oxana's dog.

Evan's dog = $\underline{7} \times \underline{9}$ Multiply.

= $\underline{63}$

So, Evan's dog weighs 63 pounds.

Math Talk (MP) Construct arguments and critique reasoning of others.

How can you tell if you found the correct weight of Evan's dog?

Possible explanation: my answer matches the information given in the problem. Oxana's dog weighs 9 pounds. Evan's dog weighs 63 pounds. 9 + 63 = 72, the total weight of both dogs. 63 pounds is 7 times as much as 9 pounds since 7 × 9 = 63.

Chapter 3 • Lesson 2   83

(ML) ## Multilingual Support

STRATEGY: Frontload

Have students follow in their book as you read a word problem aloud.

- Ask questions to help students figure out how to draw a model to help them with the process of solving a word problem.

- After you have helped students draw a model, put them in pairs and have them discuss their model with a partner.

To find how many times as much, use a multiplication model. To find how many more or fewer, model the addition or subtraction.

Evan's dog weighs 63 pounds. Oxana's dog weighs 9 pounds. How much more does Evan's dog weigh than Oxana's dog?

Example 2 Use an addition or subtraction model.

STEP 1 Draw a model. Let n represent the unknown.

Think: Let n represent the difference.

Evan's	63
Oxana's	9

n

STEP 2 Use the model to write an equation. Find the value of n.

$\underline{63} - \underline{9} = n$ Think: The model shows a difference.

$63 - 9 = \underline{54}$ Subtract.

The value of n is $\underline{54}$.

n is $\underline{\text{how much more Evan's dog weighs}}$.

So, Evan's dog weighs 54 pounds more than Oxana's dog.

Math Talk: Possible explanation: I need to think about whether I am finding how many times as much or how many more or fewer.

Share and Show Math Board

1. Maria's dog weighs 6 times as much as her rabbit. Together, the pets weigh 56 pounds. What does Maria's dog weigh?

Draw a model. Let n represent the unknown.

Dog	n	n	n	n	n	n

Rabbit	n

Write an equation to find the value of n. $7 \times n = \underline{56}$. n is $\underline{8}$ pounds.

Multiply to find how much Maria's dog weighs. $8 \times 6 = \underline{48}$

So, Maria's dog weighs $\underline{48}$ pounds.

Math Talk
MP Reason abstractly and quantitatively.
How do you know which model to use to solve a comparison problem?

Example 2

MP **Attend to precision.**

Ask a volunteer to read the problem aloud.

- **How is this problem like the first problem, and how is it different?** Possible answer: Both compare amounts. The first problem involves "times as much as." This problem asks "how much more."
- **What do you need to find in this problem?** how much more Evan's dog weighs than Oxana's dog
- **Look at the model in Step 1. How is this model different from the model in the first problem?** Possible answer: Different length boxes represent the weight of each dog.

Discuss Step 2 with students.

- **Why should you use subtraction in this equation?** Possible answer: Subtraction is used to find the difference between the two weights.
- **How would the question the problem asks be different if a multiplication model could be used to represent the problem?** Possible answer: How many times as much as Oxana's dog does Evan's dog weigh?
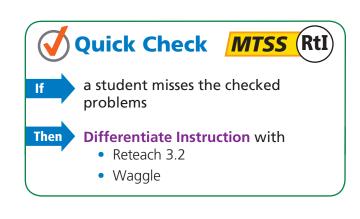
❸ Explain

Share and Show Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

MP **Reason abstractly and quantitatively.**

Math Talk Use **Math Talk** to help students recognize the difference between the bar models used to represent additive comparison situations and multiplicative comparison situations.

Ready for More   🕐 | Visual Individual

- Have students solve the following problem.

Fifty-six students play on 3 kickball teams at recess. There are 2 fourth-grade teams and 1 fifth-grade team. Each of the fourth-grade teams has an equal number of students, and together they have 3 times as many students as the fifth-grade team. How many students does each fourth-grade team have? How many students does the fifth-grade team have?

- Have students draw models to solve the problem. Check students' drawings; each fourth-grade team: 21 students; fifth-grade team: 14 students

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✔ Quick Check **MTSS RtI**

If → a student misses the checked problems

Then → **Differentiate Instruction** with
- Reteach 3.2
- Waggle

④ Elaborate

On Your Own

If students complete the checked problems correctly, they may continue.

Problem 7 This is a two-step problem that involves both multiplying to compare and subtracting to compare. Have students first draw a bar model for *times as many as*. Then they can use their solution to help draw and complete the bar model for *how many more*.

Draw a model. Write an equation and solve.

✔ **2.** Last month Nikita trained 3 times as many dogs as cats. If the total number of cats and dogs she trained last month is 28, how many cats did Nikita train?

Draw a model.

Dogs | n | n | n | ⎤
Cats | n | ⎦ 28

Write an equation and solve.

$4 \times n = 28$

$n = 7$

Nikita trained 7 cats.

✔ **3.** How many more dogs than cats did Nikita train?

Draw a model.

Dogs | 21 |
Cats | 7 | n |

Write an equation and solve.

$21 - 7 = n$

$n = 14$

Nikita trained 14 more dogs than cats.

On Your Own

Practice: Copy and Solve Draw a model.
Write an equation and solve.

4. At the dog show, there are 4 times as many boxers as spaniels. If there are a total of 30 dogs, how many dogs are spaniels?

6 spaniels

5. There are 5 times as many yellow labs as terriers in the dog park. If there are 18 dogs at the dog park, how many yellow labs are there?

15 yellow labs

6. Vadim has 3 times as many guppies as goldfish. If he has 28 fish, how many guppies does he have?

21 guppies

7. Carlita saw 5 times as many robins as cardinals while bird watching. She saw a total of 24 birds. How many more robins did she see than cardinals?

16 more robins

Chapter 3 • Lesson 2   85

Meeting Individual Needs

Reteach 3.2   **MTSS RtI1**

Name _____

Comparison Problems

Jamie has 3 times as many baseball cards as Rick. Together, they have 20 baseball cards. How many cards does Jamie have?

Step 1 Draw a box with the letter n in it to show that Rick has an unknown number of cards. Jamie has 3 times as many cards as Rick, so draw three identical boxes to represent Jamie's cards.

Jamie | n | n | n | 20
Rick | n |

Step 2 Use the model to write an equation.
Think: There are 4 equal boxes. The number in each box is represented by n.

There are a total of 20 cards. So, __4__ $\times n =$ __20__

Step 3 Solve the equation to find the value of n.
Think: 4 times what number is 20?
Since $4 \times$ __5__ $= 20$, the value of n is __5__.

Rick has __5__ cards.

Step 4 Find how many cards Jamie has.
Think: Jamie has 3 times as many cards as Rick.

So, Jamie has $3 \times$ __5__ $=$ __15__ baseball cards.

Draw a model. Write an equation and solve.

1 Maddie has 2 times as many stickers on her notebook as Meg. Together, they have 15 stickers. How many stickers are on Maddie's notebook?

Maddie | n | n |
Meg | n | 15

10 stickers

2 How many more stickers are on Maddie's notebook than on Meg's notebook?

Maddie | 10 |
Meg | 5 | n |

5 more stickers

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Enrich 3.2

Name _____

Mixed Models

Solve each problem.

1 Together, Tom and Max have 72 football cards. Tom has 2 more than 4 times as many cards as Max has. How many football cards does Tom have?

58 football cards

2 Naomi has 50 red beads and white beads. The number of red beads is 1 more than 6 times the number of white beads. How many red beads does Naomi have?

43 red beads

3 Javier rode his bike for a total of 41 minutes. Before lunch, he rode for 1 minute less than 5 times the number of minutes he rode after lunch. How many minutes did Javier ride before lunch?

34 minutes

4 Marnie practiced her basketball dribbling. After two tries, she had bounced the ball 88 times. On the second try, she had 2 fewer bounces than 8 times the number of bounces she had on the first try. How many bounces did she have on the second try?

78 bounces

5 Write Math How can a multiplication model help you solve Problem 1?

Possible answer: draw one box with n in it for Max. Draw 4 boxes with n in each for Tom, and write "+ 2" to the right of the boxes. Write 72 for the total number of cards.

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8. Cienna and Sven are solving math problems using equations. Tell whether each person's equation is *true* or *false*. Explain your answer.

   Cienna
   5×8=8+8+8+8+8

   Sven
   56÷7=15−6

   Cienna's equation is true and Sven's is false; Sample

   explanation: Both sides of Cienna's equation equal 40.

   56 ÷ 7 = 8, but 15 − 6 = 9, and 8 does not equal 9.

9. Is the equation true or false? Explain.

   $$5 \times 11 = 5 + 5 + 5 + 5 + 5$$

   false; 5 × 11 means 11 is added 5 times or 5 is added

   11 times.

10. Noah built a fenced dog run that is 4 times as long as it is wide. The width is 3 yards. He placed posts at every corner and every yard along the length and width of the run. How many posts did he use?

    30 posts

11. Last weekend, Mandy collected 4 times as many shells as Cameron. Together, they collected 60 shells. How many shells did Mandy collect? Complete the bar model. Then, write an equation and solve.

    Mandy | n | n | n | n
    60
    Cameron | n

    5 × n = 60
    n = 12
    12 × 4 = 48
    Mandy collected 48 shells.

Show the Math
Demonstrate Your Thinking

Problem Solving Applications **Real World**

(MP) **Attend to precision.**

Problem 9 This problem requires students to determine if the equation is true or false. Students must then explain their reasoning using what they know about multiplication.

Problem 10 This problem encourages students to draw a diagram with the fence posts.

Problem 11 This problem assesses students' ability to change comparative situations into equations with an unknown number. Students should recognize the phrase *times as many as* is an indication that this is a multiplication problem. Students should identify the top row of 4 boxes as representing Mandy's shells, and they should recognize that there are 4 times as many boxes as the one below.

⑤ Evaluate | Formative Assessment

I Can Objective

Have students write to demonstrate the skill for the I Can statement.

I can draw models and write equations to help solve comparison problems by . . . using a bar model that helps you visualize the amounts being compared and helps you decide if you need to multiply or subtract to solve.

Exit Ticket

Write a problem involving *how much more than* and solve it. Explain how drawing a diagram helped you solve the problem.

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™
Version 2.0
Differentiated Centers Kit

Tabletop Flipchart
Mini-lessons for reteaching to targeted small groups

Readers
Supports key math skills and concepts in real-world situations.

Games
Reinforce math content and vocabulary

Activities
Meaningful and fun math practice

Practice and Homework

Comparison Problems

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Comparison Problems

Draw a model. Write an equation and solve.

1. Sarita made a necklace using 4 times as many blue beads as red beads. She used a total of 40 beads. How many blue beads did Sarita use?

Think: Sarita used a total of 40 beads. Let n represent the number of red beads.

blue	n	n	n	n

red	n

40

$5 \times n = 40; 5 \times 8 = 40;$

$4 \times 8 = 32$ **blue beads**

2. At the zoo, there were 3 times as many monkeys as lions. Tom counted a total of 11 lions. How many monkeys were there?

monkeys: 11 | 11 | 11

lions: 11

$3 \times 11 = 33$ **monkeys**

Problem Solving Real World

3. Rafael counted a total of 40 white cars and yellow cars. There were 9 times as many white cars as yellow cars. How many white cars did Rafael count?

36 white cars

4. Is the equation true or false? Explain.

$6 \times 12 = 12 + 12 + 12 + 12 + 12 + 12$

true; multiplying 6 and 12 is the same as adding 12 six times.

5. Write Math Write a problem involving *how much more than* and solve it. Explain how drawing a diagram helped you solve the problem.

Check students' work.

Chapter 3 • Lesson 2   **87**

MATHEMATICAL PRACTICES AND PROCESSES

(MP) Look for and make use of structure.

Students can make sense of problems involving comparisons by drawing bar models and writing corresponding algebraic equations. Bar models help students visualize and organize the information in a problem and to write an algebraic equation to solve a problem.

The following activities can help promote students' use of bar models and algebraic equations as entry points to solving comparison-type problems:

- **Draw a bar model using the number of hours a day you are awake, the number of hours you are asleep, and how many more hours you are awake than asleep.**
- **Write an equation using a letter to show that 5 times an unknown amount is equal to 30.**
- **Write a word problem about a package of muffins that has 3 times as many corn muffins as apple muffins, with 12 muffins in all.**

Lesson Check

6. Sari has 3 times as many pencil erasers as Sam. Together, they have 28 erasers. How many erasers does Sari have?

21 erasers

7. Is the equation true or false? Explain.

$3 \times 8 = 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8$

false; 3 × 8 is the same as 3 groups of 8 or 8 added 3 times.

Spiral Review

8. Barbara has 9 stuffed animals. Trish has 3 times as many stuffed animals as Barbara. How many stuffed animals does Trish have?

27 stuffed animals

9. There are 104 students in the fourth grade at Suvi's school. One day, 15 fourth-graders were absent. How many fourth-graders were at school that day?

89 fourth-graders

10. Joshua has 112 rocks. Jose has 98 rocks. Albert has 107 rocks. Write the boy's names in order from the least to the greatest number of rocks owned.

Jose, Albert, Joshua

11. Alicia has 32 stickers. This is 4 times as many stickers as Benita has. How many stickers does Benita have?

8 stickers

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance

Multiply Tens, Hundreds, and Thousands

SNAPSHOT

Mathematical Standards

- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes

- Model with mathematics.
- Attend to precision.
- Construct arguments and critique reasoning of others.

(I Can) Objective

I can use place value and other strategies to multiply tens, hundreds, and thousands.

Learning Goal

Multiply tens, hundreds, and thousands by whole numbers through 10.

Language Objective

Students complete the I Can sentence.

MATERIALS

- MathBoard

ACROSS THE GRADES

Before	Grade 4	After
Explore multiplication of two whole numbers with products from 0 to 144, and related division facts.	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.	Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.

ABOUT THE MATH

Teaching for Depth

In this lesson, students are shown different ways to multiply tens, hundreds, and thousands by a whole number through 10.

The first strategy involves students' understanding of place value. In One Way, students draw a quick picture of the problem using a square for one hundred and a square with a T inside for one thousand. Students regroup as needed to find the answer. In Another Way, students rewrite the problem using place value. For example,

8×200 can be rewritten as 8×2 hundreds. Then students use the basic fact, 8×2, to write the answer as 16 hundreds, or 1,600.

In the second strategy, students use patterns to find products. Students visualize patterns using number lines and patterns in multiplication problems. As the number of zeros in a factor increases, the number of zeros in the product increases.

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.3

For Field Day, the students were grouped into 20 teams of 10 students each. How many is 20 tens? 200

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Materials Digit Cards (1–9)

Mental Math Have pairs practice their multiplication facts. Give partners two sets of digit cards (0–9). Have students shuffle the cards and place them facedown in a single pile on the table. One student turns over two cards and makes a 2-digit number with them. The other student states a multiplication fact with the 2-digit number as the product or states that it is not possible. Partners switch roles and continue until all cards have been played.

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Use the iTools to review skip counting by 10s.

- **What comes in 10s?** Possible answers: fingers and toes

Ask volunteers to skip count by 10s from 10 to 90 using the number chart. The students should stand and each show 10 fingers as they count off.

- **How is skip counting by 10s related to multiplying by 10?** Possible answer: Each number I say when I skip count by 10s is a product of multiplying with 10.

Have students demonstrate skip counting by 100s and 1,000s.

① Engage

with the **Interactive Student Edition**

I Can Objective

I can use place value and other strategies to multiply tens, hundreds, and thousands.

Making Connections

Invite students to tell you what they know about place value.

- **What happens to place value as you move from tens to hundreds?** The value is 10 times as great.
- **What happens to place value as you move from hundreds to thousands?** The value is 10 times as great.

Learning Activity

Josie is taking a train to visit a friend. The train has 8 cars, each with 200 seats. How many seats are on the train?

- **What are you trying to find?** how many seats are on a train
- **How many cars are on the train?** 8
- **How many seats are in one car?** 200
- **What does the 2 represent in 200?** hundreds
- **What expression will you use?** 8×200

② Explore

Unlock the Problem Real World

Read and discuss the problem. Make sure students understand that a "car" is one section of a train.

- **How many cars long is the train?** 8 cars
- **How many seats are in each car?** 200 seats

One Way

(MP) **Model with mathematics.**

Point out that drawing quick pictures can help students represent a problem.

- **What does each square on the left represent?** Each square represents 1 hundred.
- **How do the squares on the left show 8 × 200?** Possible answer: There are 8 rows of 2 squares. This shows 8 groups of 200, or 8 × 200.
- **What does the picture to the right show?** Possible answer: It shows a group of 10 hundreds regrouped as 1 thousand plus 6 hundreds.
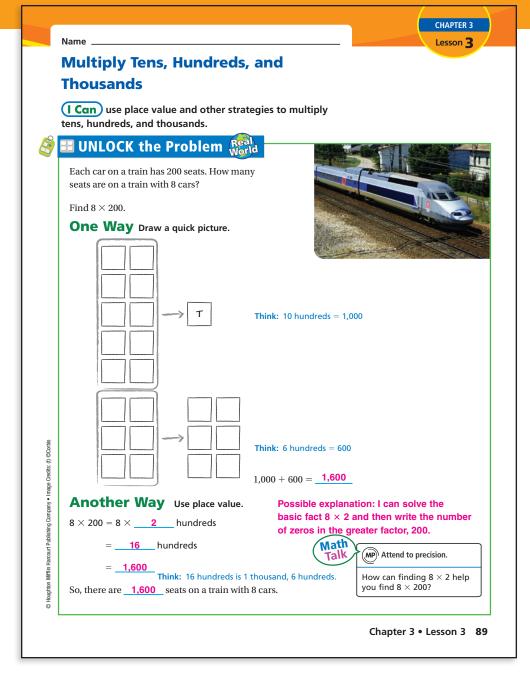
Another Way

Explain that students can use place value as another way to solve the problem.

- **How can you rename 200 using place value?** 2 hundreds
- **What basic fact can you use to help you solve this problem?** 8 × 2 = 16
- **How can you rename 16 hundreds in standard form?** Write 2 zeros after 16 to get 1,600.

(MP) **Attend to precision.**

Math Talk Use **Math Talk** to focus on students' understanding of how to use place value and the basic fact to solve the problem.

Name _____

Multiply Tens, Hundreds, and Thousands

I Can use place value and other strategies to multiply tens, hundreds, and thousands.

⊞ UNLOCK the Problem Real World

Each car on a train has 200 seats. How many seats are on a train with 8 cars?

Find 8×200.

One Way Draw a quick picture.

T

Think: 10 hundreds = 1,000

Think: 6 hundreds = 600

$1,000 + 600 =$ __1,600__

Another Way Use place value.

$8 \times 200 = 8 \times$ __2__ hundreds

Possible explanation: I can solve the basic fact 8 × 2 and then write the number of zeros in the greater factor, 200.

$ =$ __16__ hundreds

$ =$ __1,600__

Think: 16 hundreds is 1 thousand, 6 hundreds.

So, there are __1,600__ seats on a train with 8 cars.

Math Talk

(MP) **Attend to precision.**

How can finding 8 × 2 help you find 8 × 200?

Chapter 3 • Lesson 3 **89**

(ML) # Multilingual Support

STRATEGY: Scaffold Language

Draw a quick picture of a multiplication problem with tens, hundreds, and thousands by a whole number through 10.

- Have students describe the picture.
- Next prompt them to say it using place value and write a multiplication equation to match.
- Use leveled questions to help students use math language:

  Beginning: Yes/no–Is this 2 × 400?
  Intermediate: How many hundreds are there?
  Advanced: Explain how your model works.

Other Ways

A **Use a number line.**

Li's Sled Shop rents 4,000 sleds each month.
How many sleds does the store rent in 6 months?

Find 6 × 4,000.

Multiplication can be thought of as repeated addition.
Draw jumps to show the product.

```
   +4   +4   +4   +4   +4   +4
 ├────┼────┼────┼────┼────┼────┤
 0    4    8    12   16   20   24
```
$6 \times 4 = 24$ ← basic fact

```
 ├────┼────┼────┼────┼────┼────┤
 0    40   80  120  160  200  240
```
$6 \times 40 = 240$

```
 ├────┼────┼────┼────┼────┼────┤
 0   400  800 1,200 1,600 2,000 2,400
```
$6 \times 400 = 2,400$

```
 ├────┼────┼────┼────┼────┼────┤
 0  4,000 8,000 12,000 16,000 20,000 24,000
```
$6 \times 4,000 = 24,000$

So, Li's Sled Shop rents __24,000__ sleds in 6 months.

B **Use patterns.**

Basic fact:	Basic fact with a zero:
$3 \times 7 = 21$ ← basic fact	$8 \times 5 = 40$ ← basic fact
$3 \times 70 = 210$	$8 \times 50 = 400$
$3 \times 700 =$ __2,100__	$8 \times 500 =$ __4,000__
$3 \times 7,000 =$ __21,000__	$8 \times 5,000 =$ __40,000__

- How does the number of zeros in the product of 8 and 5,000 compare to the number of zeros in the factors? Explain.

Possible explanation: there are 4 zeros in the product and only 3 zeros in the factors because there is a zero in the basic fact, $8 \times 5 = 40$.

Possible description: as the number of zeros in a factor increases, the number of zeros in the product increases.

Math Talk

(MP) Construct arguments and critique reasoning of others.

Explain how the number of zeros in the factors and products changes in Example B.

90   Go Math! Grade 4

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Ready for More

🕐 | Logical
Individual

- **What is the Associative Property of Multiplication?** The property that says you may group factors any way you like and the product will remain the same.

Show students this problem: 9×80.

- **How can you write 80 as a product of a number and 10?** $80 = 8 \times 10$ This means you can rewrite the problem as $9 \times (8 \times 10)$ or, using the Associative Property of Multiplication, $(9 \times 8) \times 10$.
- **Which expression shows a basic fact?** (9×8)
- **Rewrite the expression using the product from the basic fact.** 72×10
- **So, what is the product of 9×80?** the same as the product of 72×10, or 720

Other Ways

Example A

Lead a discussion with students about why they would use multiplication to solve this problem. I am combining the number of sleds rented each month. When I combine equal groups, I can multiply to find the total.

- **How do the numbers on the number lines change from one number line to the next?** Possible answer: Each number line is 10 times as great as the number line above it.
- **How do the products 24, 240, 2,400, and 24,000 change from one product to the next?** Possible answer: Each product is 10 times as great as the product before it.
- **How does the last number line show $6 \times 4,000$?** Possible answer: The number line shows 6 jumps of 4,000.

Example B

- **Explain the pattern that you see.** Possible explanation: When you increase the number of zeros in one of the factors, there will be an equal increase in the number of zeros in the product.

(MP) **Construct arguments and critique reasoning of others.**

Math Talk Use **Math Talk** to help students recognize patterns in the number of zeros in factors and products.

- **As the number of zeros in a factor changes each time, how does the size of the factor change?** Possible answer: It becomes 10 times as great.
- **When a tens, hundreds, or thousands number is multiplied by a one-digit number, how does the number of zeros in the product compare to the number of zeros in the tens, hundreds, or thousands number?** Possible answer: There will be as many zeros in the product as in the tens, hundreds, or thousands number. There will be an additional zero if the basic fact has a zero.

⚠ **Common Errors**
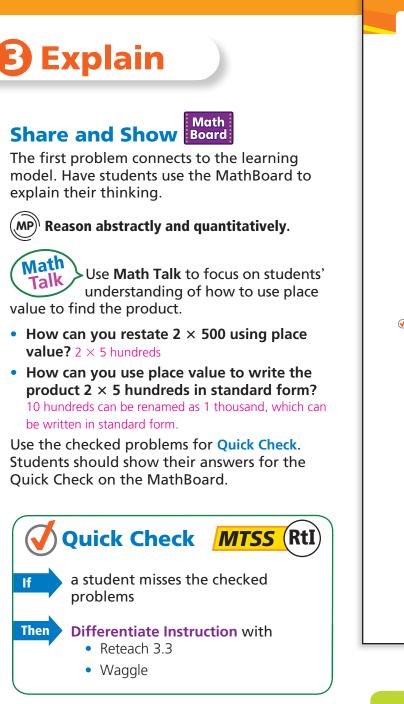
Error Students may not include the correct number of zeros in the product.

Example $8 \times 5,000 = 4,000$

Springboard to Learning Have the students write the basic fact first and then circle it before they write the zeros.

$8 \times \underline{5},000 = \underline{40},000$

③ Explain

Share and Show 🟪 Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

(MP) **Reason abstractly and quantitatively.**

(Math Talk) Use **Math Talk** to focus on students' understanding of how to use place value to find the product.

- **How can you restate 2 × 500 using place value?** 2 × 5 hundreds
- **How can you use place value to write the product 2 × 5 hundreds in standard form?** 10 hundreds can be renamed as 1 thousand, which can be written in standard form.

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✓ Quick Check MTSS (RtI)

If a student misses the checked problems

Then **Differentiate Instruction** with
- Reteach 3.3
- Waggle

On Your Own

If students complete the checked problems correctly, they may continue with the remaining problems.

- **How can you use inverse operations to find the unknown factor for Problem 11?** I can think 56 divided by 7 equals what number? Since 7 × 8 = 56, then 56 ÷ 7 = 8. So, 7 × 8,000 = 56,000.

(MP) **Construct arguments and critique reasoning of others.**

Problem 13 This problem provides students an opportunity to communicate verbally, not just demonstrate, how the product of a basic fact that ends in zero affects the number of zeros in a product.

91   Go Math! Grade 4

Name _____

Share and Show Math Board

1. Use the drawing to find 2 × 500.

[drawing of ten squares → T]

2 × 500 = **1,000**

(Math Talk) (MP) Reason abstractly and quantitatively.

Tell how you would use place value to find 2 × 500.

Possible explanation: I can think of 2 × 500 as 2 times 5 hundreds, which equals 10 hundreds. 10 hundreds equal 1,000.

Complete the pattern.

2. 3 × 8 = 24
   3 × 80 = **240**
   3 × 800 = **2,400**
   3 × 8,000 = **24,000**

3. 6 × 2 = 12
   6 × 20 = **120**
   6 × 200 = **1,200**
   6 × 2,000 = **12,000**

✓ 4. 4 × 5 = **20**
   4 × 50 = **200**
   4 × 500 = **2,000**
   4 × 5,000 = **20,000**

Find the product.

✓ 5. 6 × 500 = 6 × **5** hundreds
   = **30** hundreds
   = **3,000**

6. 9 × 5,000 = 9 × **5** thousands
   = **45** thousands
   = **45,000**

On Your Own

Find the product.

7. 7 × 6,000 = **42,000**

8. 4 × 80 = **320**

9. 3 × 500 = **1,500**

(MP) **Find the unknown factor.**

10. **7** × 9,000 = 63,000

11. 7 × **8,000** = 56,000

12. 8 × **400** = 3,200

13. (MP) How does the number of zeros in the product of 8 and 5,000 compare to the number of zeros in the factors? Explain.

Possible explanation: There are 4 zeros in the product and only 3 zeros in the factors because there is a zero in the basic fact, 8 × 5 = 40.

Chapter 3 • Lesson 3   91

Meeting Individual Needs

Reteach 3.3 MTSS (RtI1)

LESSON 3.3 Reteach

Name _____

Multiply Tens, Hundreds, and Thousands

You can use a pattern to multiply with tens, hundreds, and thousands.

Count the number of zeros in the factors.

4 × 6 = 24   ← basic fact
4 × 60 = 240   ← When you multiply by tens, the last digit in the product is 0.
4 × 600 = 2,400   ← When you multiply by hundreds, the last **two** digits in the product are 0.
4 × 6,000 = 24,000   ← When you multiply by thousands, the last **three** digits in the product are 0.

When the basic fact has a zero in the product, there will be an extra zero in the final product:

5 × 4 = 20, so 5 × 4,000 = 20,000

Complete the pattern.

1. 9 × 2 = 18
   9 × 20 = **180**
   9 × 200 = **1,800**
   9 × 2,000 = **18,000**

2. 8 × 4 = 32
   8 × 40 = **320**
   8 × 400 = **3,200**
   8 × 4,000 = **32,000**

3. 6 × 6 = 36
   6 × 60 = **360**
   6 × 600 = **3,600**
   6 × 6,000 = **36,000**

4. 4 × 7 = 28
   4 × 70 = **280**
   4 × 700 = **2,800**
   4 × 7,000 = **28,000**

Find the product.

5. 7 × 300 = 7 × **3** hundreds
   = **21** hundreds
   = **2,100**

6. 5 × 8,000 = 5 × **8** thousands
   = **40** thousands
   = **40,000**

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Enrich 3.3

LESSON 3.3 Enrich

Name _____

Multiplication Inequalities

Write <, >, or = for each ○.

1. 7 × 60 (**>**) 400

2. 700 (**<**) 90 × 8

3. 3 × 800 (**<**) 2,500

4. 2,000 (**=**) 400 × 5

5. 8 × 6,000 (**>**) 40,000

6. 3 × 9,000 (**<**) 39,000

7. 6 × 900 (**<**) 700 × 8

8. 8 × 3,000 (**=**) 6,000 × 4

9. 9 × 4,000 (**=**) 6,000 × 6

10. 800 × 9 (**<**) 3,000 × 3

11. (Write Math) Explain how you found the answer in Exercise 10.

Possible answer: I used the basic fact 8 × 9 = 72 and a pattern to find 800 × 9 = 7,200. I used the basic fact 3 × 3 = 9 and a pattern to find 3,000 × 3 = 9,000. Then I compared 7,200 and 9,000. Since 9,000 has the greater digit in the thousands place, 7,200 is less than 9,000.

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14. Joe's Fun and Sun rents beach chairs. The store rented 300 beach chairs each month in April and in May. The store rented 600 beach chairs each month from June through September. How many beach chairs did the store rent during the 6 months?

MATH on the ▸ Spot

a. What do you need to know? **the total number of beach chairs rented during the 6 months**

b. How will you find the number of beach chairs? **I will multiply 2 times 300 and 4 times 600. Then I will add the products.**

c. Show the steps you use to solve the problem.

2 × 300 = 600
4 × 600 = 2,400
600 + 2,400 = 3,000

d. Complete the sentences.

For April and May, a total of **600** beach chairs were rented.

For June through September, a total of **2,400** beach chairs were rented.

Joe's Fun and Sun rented **3,000** beach chairs during the 6 months.

15. Sveta makes bead necklaces. Beads are packaged in bags of 50 and bags of 200. Sveta bought 4 bags of 50 beads and 3 bags of 200 beads. How many beads did Sveta buy? **800 beads**

16. Hyori has 3 books of 20 stamps and 5 books of 10 stamps. How many stamps does Hyori have? Complete the steps using the numbers on the tiles. Numbers can be used more than once.

3	5
110	50
60	100

3 × 20 = **60**

5 × 10 = **50**

60 + **50** = **110**

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④ Elaborate

Unlock the Problem

Problem 14 Have students read the problem and discuss the important information. Students can make a list of the steps necessary to solve this multi-step problem.

Math on the Spot Use this video to help students model and solve this type of problem.

Problem 15 This problem assesses students' ability to use place value as well as their ability to solve multi-step problems. If students find 80 or 8,000 beads, they can write patterns or use place value with basic facts to determine the correct number of zeros in each product.

⑤ Evaluate | Formative Assessment

I Can Objective

Have students complete the I Can statement to demonstrate the skill for the I Can statement.

I can use place value and other strategies to multiply tens, hundreds, and thousands by . . . rewriting the problem using place value. For example, to find 4 × 300, I can rewrite it as 4 × 3 hundreds. Then I can solve 4 × 3 hundreds = 12 hundreds, using the basic fact 4 × 3. Then I rename 12 hundreds as 1,200 by writing 2 zeros after the basic fact.

Exit Ticket

Explain how finding 7 × 20 is similar to finding 7 × 2,000. Then find each product.

Practice and Homework

Multiply Tens, Hundreds, and Thousands

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving.

Multiply Tens, Hundreds, and Thousands

Find the product.

1. $4 \times 7{,}000 =$ **28,000**

   Think: $4 \times 7 = 28$
   So, $4 \times 7{,}000 = 28{,}000$.

2. $9 \times 60 =$ **540**

3. $8 \times 200 =$ **1,600**

4. $5 \times 6{,}000 =$ **30,000**

5. $7 \times 800 =$ **5,600**

6. $8 \times 90 =$ **720**

7. $6 \times 3{,}000 =$ **18,000**

8. $3 \times 8{,}000 =$ **24,000**

9. $5 \times 500 =$ **2,500**

10. $9 \times 4{,}000 =$ **36,000**

Problem Solving · Real World

11. A bank teller has 7 rolls of coins. Each roll has 40 coins. How many coins does the bank teller have?

    280 coins

12. Theo buys 5 packages of paper. There are 500 sheets of paper in each package. How many sheets of paper does Theo buy?

    2,500 sheets

13. Explain how finding 7×20 is similar to finding $7 \times 2{,}000$. Then find each product.

    Check students' work. _____

    _____

PROFESSIONAL LEARNING	MATH TALK IN ACTION

Teacher: Explain how you found the answer to Problem 10.

Eli: I made a quick picture of the problem. I drew 9 rows of 4 thousands blocks. That was 36 thousands blocks, or 36,000.

Teacher: How did you know what to draw?

Eli: $9 \times 4{,}000$ means 9 groups of 4,000.

Teacher: Did anyone use a different strategy?

Jessika: I looked for a pattern. I knew $4 \times 9 = 36$, so $4 \times 90 = 360$, $4 \times 900 = 3{,}600$, and $4 \times 9{,}000 = 36{,}000$.

Teacher: Explain the pattern you used.

Jessika: Each time I wrote a zero in a factor, I wrote a zero in the product.

Mattie: I found the answer a different way. I thought of $9 \times 4{,}000$ as 9×4 thousands. Then I found $4 \times 9 = 36$, so the answer is 36 thousands, or 36,000.

Teacher: Did anyone use a number line to find the product?

Roland: I did. I thought of the problem as repeated addition. So, I made a number line that started at 0. I marked 4,000; 8,000; 12,000; and so on. It increased by 4,000 each time. Then I made 9 jumps of 4,000 and ended on 36,000.

Teacher: You all used good strategies to find the product! Well done.

Lesson Check

14. A plane is traveling at a speed of 400 miles per hour. How far will the plane travel in 5 hours?

2,000 miles

15. One week, a clothing factory made 2,000 shirts in each of 6 different colors. How many shirts did the factory make in all?

12,000 shirts

Spiral Review

16. Write a comparison sentence to represent this equation.

$$6 \times 7 = 42$$

Possible answer: 6 times as many as 7 is 42.

17. The population of Middleton is six thousand, fifty-four people. Write this number in standard form.

6,054

18. There are 240 students at a school. That is eight times as many as the number of people on the staff at the school. How many people are on the staff at the school?

30 people

19. Freya picked 4 times as many green peppers as red peppers. If she picked a total of 20 peppers, how many green peppers did she pick?

16 green peppers

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance

Estimate Products by 1-Digit Numbers

SNAPSHOT

Mathematical Standards

- Use place value understanding to round multi-digit whole numbers to any place.
- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes

- Attend to precision.
- Construct arguments and critique reasoning of others.
- Look for and make use of structure.
- Reason abstractly and quantitatively.

(I Can) Objective

I can estimate products by rounding and determine if exact answers are reasonable.

Learning Goal

Estimate products by rounding and determine if exact answers to multiplication problems are reasonable.

Language Objective

Students offer advice on how to determine if exact answers are reasonable when estimating products by rounding.

MATERIALS

- MathBoard

ACROSS THE GRADES

Before	Grade 4	After
Round whole numbers from 0 to 1,000 to the nearest 10 or 100.	Explore the multiplication and division of multi-digit whole numbers using estimation, rounding and place value.	Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value.

ABOUT THE MATH

Why Teach This

One way to determine if an answer is reasonable is to use operation sense. If you multiply two 2-digit whole numbers and get a 2-digit product, you know that is not reasonable because the product must be greater than two digits.

Another way is to use estimation. In this lesson, students use different estimation strategies to decide if an answer is reasonable. Some students will check their work by reworking the computation, but most students will not check their work at all. Teaching them to use estimation will help them find their mistakes.

This is particularly important when students are using calculators. Knowing that calculators do not make mistakes, some students accept the calculator's answer even if it is unreasonable. They often forget that they can make inputting mistakes. Estimating to check for reasonableness will benefit these students.

For more professional learning, go online to Teacher's Corner.

Tia and her mom paid $12 for a child's ticket and an adult ticket to attend a flower show. An adult ticket cost 2 times as much as a child's ticket. How much was an adult ticket? **$8**

Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Round Whole Numbers Have students round each number to the place value that is underlined.

354	**400**	2,956	**3,000**	2,956	**3,000**
442	**400**	5,694	**5,690**	849	**800**
8,499	**8,000**	747	**750**	322	**320**

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Lead a discussion about place value and rounding strategies. Write 153 on the board and use the iTools: Number Lines.

Graph 153 on a number line from 100 to 200. Discuss how the number line can be used to round 153 to the nearest hundred.

- **Explain how to round 153 to the nearest hundred without using a number line.** Look at the place to the right of the hundreds place. Since it is 5, round to the next hundred. 153 rounded to the nearest hundred is 200.

① Engage

with the **Interactive Student Edition**

I Can Objective

I can estimate products by rounding and determine if exact answers are reasonable.

Making Connections

Invite students to tell you what they know about estimating.

- **What does it mean to *estimate*?** to come up with an approximate number or calculation
- **What are examples of when you estimate every day?** Possible answers: shopping, time to complete homework, number of people in a room
- **Why is estimation a helpful tool?** Estimation lets you get an approximate idea for a value without (or before) calculating the exact value.

Learning Activity

Over the span of an hour, 8 customers stopped at a remote gas station. Each purchased 25 gallons of gas. How many gallons of gas did the gas station sell in all?

- **There were how many customers in the last hour?** 8 customers
- **How many gallons of gas did each customer buy?** 25 gallons
- **Is 200 gallons a reasonable answer? Explain.** yes; Possible explanation: I can round the greater factor, 25, to 30 and multiply 8 times 3 tens = 24 tens, or 240. So, 200 is a reasonable answer.

② Explore

Unlock the Problem

MP Attend to precision.

- **Do you think all African elephants can lift the same number of pounds? Explain.**
  Possible answer: No, that is one reason that this is an estimation problem.

Point out that since the question begins with the word *about*, the answer to this problem should be an estimate, not an exact answer.

One Way

Discuss with students different ways that they can multiply 3 × 200 to find the estimated product.

- **How can you draw a quick picture to multiply 3 × 200?** I can draw three rows of squares with two squares in each row.
- **How can you use a number line to multiply 3 × 200?** I can mark the number line with tick marks of 200, start at 0, and skip count by 200 three times.

Another Way

Explain that the maximum and minimum numbers produced by rounding to the next higher hundred and the next lower hundred represent a range of possible estimates.

MP Look for and make use of structure.

- **How could you use the Associative Property of Multiplication to multiply 3 × 200?**
  3 × (2 × 100) = (3 × 2) × 100 = 6 × 100 = 600

MP Construct arguments and critique reasoning of others.

Math Talk Use **Math Talk** to help students compare the estimate and the exact answer without actually calculating the exact answer.

Name _____

Estimate Products by 1-Digit Numbers

I Can estimate products by rounding and determine if exact answers are reasonable.

⊞ UNLOCK the Problem

~~An elephant can reach as high as 23 feet with its trunk~~. It uses its trunk to pick up objects that weigh up to ③ times as much as a ⓷⑥⑤-pound person. About how much weight can an African elephant pick up with its trunk?

- Cross out the information you will not use.
- Circle the numbers you will use.
- How will you use the numbers to solve the problem?
  Estimate 3 × 165.

One Way Estimate by rounding.

STEP 1 Round the greater factor to the nearest hundred.

3 × 165
↓
3 × 200

STEP 2 Use mental math.

Think: 3 × 200 = 3 × 2 hundreds
= 6 hundreds
= **600**

So, an African elephant can pick up about 600 pounds with its trunk.

Another Way Estimate by finding two numbers the exact answer is between.

3 × 165   3 × 165
↓   ↓
3 × 100 = **300**   3 × 200 = **600**

Think: 165 is between 100 and 200. Use those numbers to estimate.

So, an African elephant can pick up between 300 and 600 pounds.

An African elephant is the largest living land mammal.

1. Is 200 less than or greater than 165? ____**greater than**____

2. So, would the product of 3 and 165 be less than or greater than 600? ____**less than**____

600; possible explanation: 165 is closer to 200 than to 100, so the exact answer is closer to 3 × 200 than 3 × 100.

Math Talk **MP** Construct arguments and critique reasoning of others.
Is the exact answer closer to 300 or 600? Why?

Chapter 3 • Lesson 4   **95**

ⓂⓁ Multilingual Support
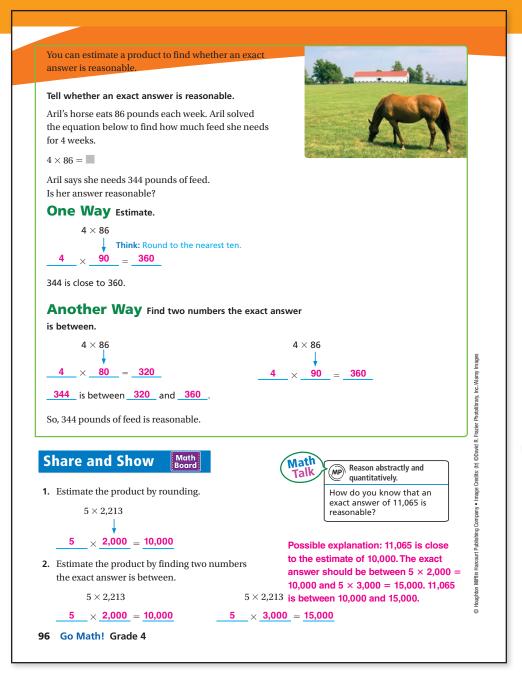
STRATEGY: Illustrate Understanding

Place students with partners. Write on the board *trunk* and *feed*. Say, **Both of these words–trunk and feed–have two meanings**.

- Have students draw a picture to show understanding of each word in context.
- Students should differentiate between *trunk* as an elephant's trunk and a chest, and *feed* as animal food and a verb, "feeding animals."

You can estimate a product to find whether an exact answer is reasonable.

Tell whether an exact answer is reasonable.

Aril's horse eats 86 pounds each week. Aril solved the equation below to find how much feed she needs for 4 weeks.

$4 \times 86 = \blacksquare$

Aril says she needs 344 pounds of feed.
Is her answer reasonable?

One Way Estimate.

4×86

Think: Round to the nearest ten.

$\underline{4} \times \underline{90} = \underline{360}$

344 is close to 360.

Another Way Find two numbers the exact answer is between.

4×86 4×86

$\underline{4} \times \underline{80} = \underline{320}$ $\underline{4} \times \underline{90} = \underline{360}$

$\underline{344}$ is between $\underline{320}$ and $\underline{360}$.

So, 344 pounds of feed is reasonable.

Share and Show   Math Board

1. Estimate the product by rounding.

   $5 \times 2{,}213$

   $\underline{5} \times \underline{2{,}000} = \underline{10{,}000}$

2. Estimate the product by finding two numbers the exact answer is between.

   $5 \times 2{,}213$ $5 \times 2{,}213$

   $\underline{5} \times \underline{2{,}000} = \underline{10{,}000}$ $\underline{5} \times \underline{3{,}000} = \underline{15{,}000}$

96 Go Math! Grade 4

Math Talk (MP) Reason abstractly and quantitatively.

How do you know that an exact answer of 11,065 is reasonable?

Possible explanation: 11,065 is close to the estimate of 10,000. The exact answer should be between $5 \times 2{,}000 = 10{,}000$ and $5 \times 3{,}000 = 15{,}000$. 11,065 is between 10,000 and 15,000.

Ready for More   Visual Partners

Materials 5 index cards and a bag for each pair

- Write 400, 600, 700, 800, and 900 on index cards.
- Have each pair of students pull a card and then work together to write multiplication problems that equal the estimated product. Challenge students to write as many problems as possible in 1 minute.

400 800 600 900 700

Example: Estimated product 800		
205	789	395
× 4	× 1	× 2

Explain that using estimation is one way of checking that an answer is reasonable.

One Way

Guide students to round the greater factor.

- **Why do you multiply 4 × 90?** Possible answer: 4×90 will give you an estimate. If 344 is close to the estimate, 344 is reasonable.

Another Way

Let students know that they can round to the nearest higher and lower ten to find two numbers that the exact answer is between.

- **Where does the factor 80 come from?** The factor 86 is rounded to the lower ten, or 80.
- **How do you know that the actual answer is between the two products you found?** Possible answer: The factor 86 is between 80 and 90.

③ Explain

Share and Show   Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

(MP) **Reason abstractly and quantitatively.**

Math Talk Use **Math Talk** to focus on students' understanding of using an estimate to check an exact answer for reasonableness.

- **How do the results of rounding show that 11,065 is reasonable?** 11,065 is close to 10,000.
- **How do the results of finding a range show that 11,065 is reasonable?** 11,065 is between 10,000 and 15,000.

⚠ Common Errors
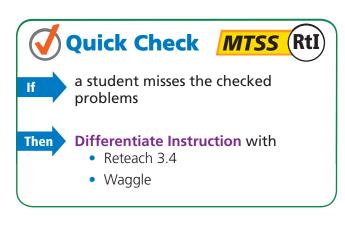
Error Students may write the incorrect number of zeros when they multiply multiples of ten.

Example For Problem 1, students find $5 \times 2{,}000 = 100{,}000$.

Springboard to Learning Have students use words to describe the multiplication expression *five groups of two thousand*. Have students ask themselves if their product makes sense.

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

④ Elaborate

On Your Own

If students complete the checked problems correctly, they may continue.

MP **Reason abstractly and quantitatively.**

- **How can you tell whether the exact answer in Problem 5 is reasonable?** Possible answer: Round $58 to $60 and multiply 3 × $60.

Problem 8 Students should look at the answer choices to help them determine the estimation strategy they should use. Recognizing that all answer choices are multiples of 100, they will need to round 265 to the greater hundred and also to the lesser hundred to determine a range of numbers between 600 (3 × 200) and 900 (3 × 300).

Name _____

Tell whether the exact answer is reasonable.

✓ **3.** Kira needs to make color copies of a horse show flyer. The printer can make 24 copies in 1 minute. Kira says the printer makes 114 copies in 6 minutes.

Possible explanation: The answer is not reasonable because it is not between the estimates of 120 and 180.

✓ **4.** Jones Elementary is having a car wash to raise money for a community horse trail. Each car wash ticket costs $8. Tiara says the school will receive $1,000 if 125 tickets are sold.

Possible explanation: The answer is reasonable because $1,000 is between the estimates of $800 and $1,600.

On Your Own

Tell whether the exact answer is reasonable.

5. **MP** Mrs. Dorji sells a roll of coastal Bermuda horse hay for $58. She says she will make $174 if she sells 3 rolls.

Possible explanation: The answer is reasonable because 174 is close to the estimate of 180.

6. Mr. Molefe sells horse supplies. A pair of riding gloves sells for $16. He says he will make $144 if he sells 9 pairs.

Possible explanation: The answer is reasonable because it is between the estimates of $90 and $180.

7. Path A and Path B are walking paths used for horses. Path A is 118 feet long. Path B is 180 feet long. Carlos walks his horse down each path 3 times. Which path did Carlos use to walk his horse about 500 feet? Explain.

Path B; possible explanation: I rounded 118 to 100 and multiplied by 3; 3 × 100 = 300. I then rounded 180 to 200 and multiplied by 3; 3 × 200 = 600. 500 is closer to the estimate of 600 than it is to the estimate of 300.

8. Students in the third grade sell 265 tickets to the school play. Students in the fourth grade sell 3 times as many tickets as the third grade students. Estimate the number of tickets the fourth grade students sold by finding the two numbers the exact answer is between.

The students sold between

0		300
300		600
600	and	**900**	tickets.
800		1,200

Meeting Individual Needs

Reteach 3.4   MTSS RtI1

Name _____   LESSON 3.4 Reteach

Estimate Products by 1-Digit Numbers

You can use rounding to estimate products.

Round the greater factor. Then use mental math to estimate the product.

6 × 95

Step 1 Round 95 to the nearest ten.   95 rounds to **100.**

Step 2 Use patterns and mental math.
6 × 1 = 6
6 × 10 = 60
6 × 100 = **600**

Find two numbers the exact answer is between.

7 × 759

Step 1 Estimate by rounding to the lesser hundred.

7 × 759
Think: 7 × 7 = 49
7 × 70 = 490
7 × 700 = 4,900
7 × 700 = 4,900

Step 2 Estimate by rounding to the greater hundred.

7 × 759
Think: 7 × 8 = 56
7 × 80 = 560
7 × 800 = 5,600
7 × 800 = 5,600

So, the product is between 4,900 and 5,600.

Estimate the product by rounding. Possible estimates are given.

1 6 × 316 _____ 1,800
2 5 × 29 _____ 150
3 4 × 703 _____ 2,800

Estimate the product by finding two numbers the exact answer is between. Possible estimates are given.

4 3 × 558 _____ 1,500 and 1,800
5 7 × 252 _____ 1,400 and 2,100
6 8 × 361 _____ 2,400 and 3,200

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13

Enrich 3.4

Name _____   LESSON 3.4 Enrich

Find the Unknown Factors

Choose two factors from the box to make the estimated product. You may use the factors more than once.

| 3 | 5 | 624 |
| 9 | 126 | 957 |

1 1,800 = **3** × **624**
2 500 = **5** × **126**
3 5,000 = **5** × **957**
4 900 = **9** × **126**

| 8 | 7 | 435 |
| 6 | 899 | 273 |

5 1,800 = **6** × **273**
6 6,300 = **7** × **899**
7 3,200 = **8** × **435**
8 2,100 = **7** × **273**

| 5 | 6,149 | 3,044 |
| 2 | 3 | 8,756 |

9 30,000 = **5** × **6,149**
10 6,000 = **2** × **3,044**
11 9,000 = **3** × **3,044**
12 45,000 = **5** × **8,756**

13 **Stretch Your Thinking** Two factors have an estimated product of 10,000. One of these factors is a single digit. What two factors could they be? Explain your thinking.

Possible answers: 5 × 1,951, 2 × 5,328, 1 × 9,845; they can be any two factors that round to 5 × 2,000, 2 × 5,000, or 1 × 10,000 so the estimated product equals 10,000.

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Make Predictions

As you read a story, you make predictions about what might happen next or about how the story will end.

When you solve a math problem, you make predictions about what your answer might be.

An *estimate* is a prediction because it helps you to determine whether your answer is correct. For some problems, it is helpful to make two estimates—one that is less than the exact answer and one that is greater.

Predict whether the exact answer will be *less than* or *greater than* the estimate. Explain your answer.

9. The food stand at the zoo sold 2,514 pounds of hamburger last month. The average cost of a pound of hamburger is $2. Jeremy estimates that about $6,000 worth of hamburger was sold last month.

   Less than; The actual amount of hamburger sold is 486 pounds less than the estimated amount of 3,000 pounds. So, the exact answer will be less than the estimate.

10. A zoo bought 2,240 pounds of fresh food for the bears this month. The average cost of a pound of food is $4. Jeremy estimates that about $8,000 was spent on fresh food for the bears this month.

   Greater than; The actual amount of food bought for the bears this month was 240 pounds greater than the estimated amount of 2,000 pounds. So, the exact answer will be greater than the estimate.

MATH on the ▶ Spot

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Version 2.0

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Activities

Meaningful and fun math practice

Cross-Curricular: Reading

When students estimate before they solve a problem, they are using information from the problem and prior knowledge to make a prediction.

- **Problem 9 Why is the exact answer less than Jeremy's estimate?** Possible answer: He rounded 2,514 up to 3,000, so $6,000 is an overestimate.

Math on the Spot Use this video to help students model and solve this type of problem.

- **Problem 10 Why is the exact answer greater than Jeremy's estimate?** Possible answer: He rounded 2,240 down to 2,000.

- **When you estimate before solving a problem, what are you predicting?** Possible answers: the number of places in the answer, a reasonable answer

5 Evaluate | Formative Assessment

I Can Objective

Have students offer advice to another student to demonstrate the skill for the I Can statement.

I can estimate products by rounding and determine if exact answers are reasonable by . . . rounding the greater factor to the nearest higher place and then multiply using mental math.
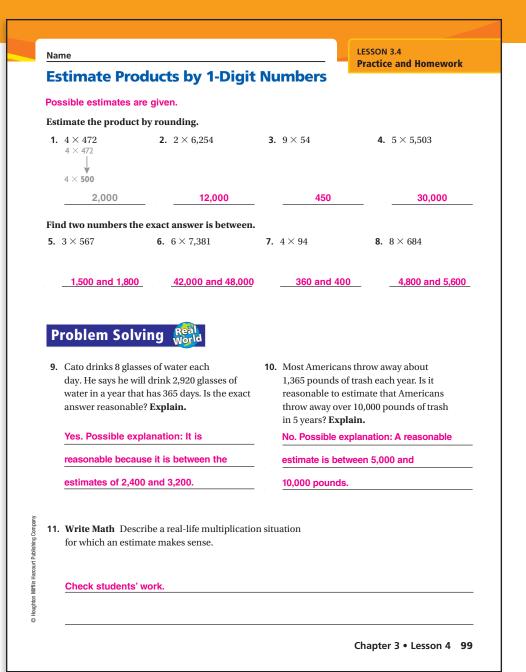
Exit Ticket

Describe a real-life multiplication situation for which an estimate makes sense.

Practice and Homework

Estimate Products by 1-Digit Numbers

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Estimate Products by 1-Digit Numbers

Possible estimates are given.

Estimate the product by rounding.

1. 4×472
4×472
↓
$4 \times \mathbf{500}$

2,000

2. $2 \times 6,254$

12,000

3. 9×54

450

4. $5 \times 5,503$

30,000

Find two numbers the exact answer is between.

5. 3×567

1,500 and 1,800

6. $6 \times 7,381$

42,000 and 48,000

7. 4×94

360 and 400

8. 8×684

4,800 and 5,600

Problem Solving Real World

9. Cato drinks 8 glasses of water each day. He says he will drink 2,920 glasses of water in a year that has 365 days. Is the exact answer reasonable? **Explain.**

Yes. Possible explanation: It is

reasonable because it is between the

estimates of 2,400 and 3,200.

10. Most Americans throw away about 1,365 pounds of trash each year. Is it reasonable to estimate that Americans throw away over 10,000 pounds of trash in 5 years? **Explain.**

No. Possible explanation: A reasonable

estimate is between 5,000 and

10,000 pounds.

11. Write Math Describe a real-life multiplication situation for which an estimate makes sense.

Check students' work.

Chapter 3 • Lesson 4   99

Lesson Check

12. A theater has 4,650 seats. If the theater sells all the tickets for each of its 5 shows, about how many tickets will the theater sell?

_____Possible estimate: about 25,000 tickets_____

13. Washington Elementary has 4,358 students. Jefferson High School has 3 times as many students as Washington Elementary. About how many students does Jefferson High School have?

_____12,000 students_____

Spiral Review

14. Tell whether each equation is true or false.

a. $6 \times 3 = 6 + 6 + 6$ _____**true**_____

b. $2 \times 5 = 5 + 5 + 5 + 5 + 5$ _____**false**_____

c. $7 \times 4 = 4 + 4 + 4 + 4 + 4 + 4$

_____**false**_____

d. $8 + 8 + 8 + 8 = 4 \times 8$ _____**true**_____

15. Mr. Turkowski bought 4 boxes of envelopes at the office supply store. Each box has 500 envelopes. How many envelopes did Mr. Turkowski buy?

_____2,000 envelopes_____

16. Pennsylvania has a land area of 44,816 square miles. What is the land area of Pennsylvania rounded to the nearest hundred?

_____44,800 square miles_____

17. The table shows the types of movies people downloaded last month.

Movie Downloads	
Type	**Number Downloaded**
Comedy	6,720
Drama	4,032
Action	5,540

How many comedy and action movies were downloaded last year?

_____12,260 movies_____

Lesson at a Glance
Multiply Using the Distributive Property

SNAPSHOT

Mathematical Standards
- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes
- Model with mathematics.
- Construct arguments and critique reasoning of others.
- Attend to precision.

(I Can) Objective
I can use models, equations, and the Distributive Property to solve 2-digit by 1-digit multiplication problems.

Learning Goal
Use the Distributive Property to multiply a 2-digit number by a 1-digit number.

Language Objective
Student pairs discuss how to use the Distributive Property to multiply a 2-digit number by a 1-digit number.

MATERIALS
- MathBoard
- color pencils
- grid paper
- base-ten blocks

ACROSS THE GRADES

Before	Grade 4	After
Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability.	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.
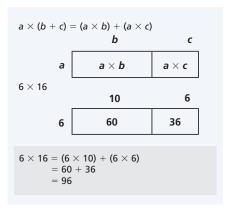
ABOUT THE MATH

Using a Rectangular or Area Model
The Distributive Property is the underlying concept for multiplication of greater numbers.

- The Distributive Property is often illustrated by an algebraic equation. A model helps you visualize how the property works.
- Students learn to draw a model for multiplying a 2-digit number by a 1-digit number. They label the model with the partial products. They can see how multiplication is distributed over addition.

In an upcoming lesson, students connect the model to the algorithm as they record the partial products and add them to find the product.

$a \times (b + c) = (a \times b) + (a \times c)$

	b	c
a	$a \times b$	$a \times c$

6×16

	10	6
6	60	36

$6 \times 16 = (6 \times 10) + (6 \times 6)$
$= 60 + 36$
$= 96$

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.5

Patrick has a stamp collection. He has stamps from 9 different countries. He has 175 stamps for each different country. Write an expression that would give an estimate of how many stamps Patrick has. 9×200

🖥 Vocabulary ▮area model▮, ▮Distributive Property▮, ▮partial product▮

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Write the following problems on the board. Have students practice basic division facts by writing quotients as fast as possible.

$18 \div 3 = 6$	$24 \div 6 = 4$
$20 \div 4 = 5$	$45 \div 5 = 9$
$36 \div 9 = 4$	$32 \div 4 = 8$
$56 \div 8 = 7$	$42 \div 7 = 6$
$48 \div 6 = 8$	$24 \div 8 = 3$
$15 \div 3 = 5$	$30 \div 5 = 6$
$54 \div 6 = 9$	$72 \div 9 = 8$
$40 \div 8 = 5$	$25 \div 5 = 5$

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Have students share their experiences with drawing rectangular models. Ask students if they have ever drawn a map of a room.

- **What shape did you make the map?** Possible answer: a rectangle
- **How might you show that one side of the room is for your desk area?** Possible answer: draw a line to show the part

① Engage

with the Interactive Student Edition

I Can Objective

I can use models, equations, and the Distributive Property to solve 2-digit by 1-digit multiplication problems.

Making Connections

Invite students to tell you what they know about properties of multiplication.

- **What are some properties of multiplication?** Possible answers: Associative Property, Commutative Property
- **How are these properties helpful?** Possible answer: You can group numbers or change their order to make multiplication easier.

Learning Activity

Each week, Shell's neighbor, Mr. Wong, goes to a local diner on Monday, Tuesday, Thursday, and Saturday nights. He drives to the diner and parks for 19 minutes. For how many minutes each week is Mr. Wong parked at the diner?

- **What are you trying to find?** the number of minutes Shell's neighbor is parked at the diner in total over 4 nights
- **How long does Shell's neighbor park at the diner each night?** 19 minutes
- **How many nights per week does Shell's neighbor go to the diner?** 4 nights
- **What expression will help you find the answer?** 4×19

② Explore

Investigate

(MP) Model with mathematics.

Students will use grid paper and draw an area model to represent 6 × 13. When the squares of an array are pushed together, it is sometimes referred to as an *area model*.

A A rectangle can be drawn that is 6 units down and 13 units across.

B Students should draw a vertical line on the model to separate 6 rows of 13 into 6 rows of 5 and 6 rows of 8.

- **How does breaking apart the model help you multiply 6 × 13?** Possible answer: I can break apart 13 into lesser numbers and use basic facts to multiply.

C Give students an opportunity to share the different ways they broke apart 13.

- **Describe the number of rows and columns in each of your rectangles.** Possible answer: I used 6 × 6 and 6 × 7.

Share with students that they have just used the Distributive Property. Read the definition of the Distributive Property again with students.

(MP) Attend to precision.

Have students restate the Distributive Property in their own words and explain how using the rectangular model demonstrates using the property.

Students should recognize that the vertical line they drew broke the larger rectangle into two smaller rectangles, each representing a product. The sum of the products of both rectangles is the product of 6 × 13.

Name _____

Multiply Using the Distributive Property

(I Can) use models, equations, and the Distributive Property to solve 2-digit by 1-digit multiplication problems.

Investigate
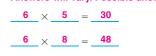
Materials ■ color pencils, grid paper

You can use the Distributive Property to break apart numbers to make them easier to multiply.

The **Distributive Property** states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.

A. Outline a rectangle on the grid to model 6 × 13.

B. Think of 13 as 5 + 8. Break apart the model to show 6 × (5 + 8). Label and shade the smaller rectangles. Use two different colors.
Check students' models.

Use the Distributive Property. Find the product each smaller rectangle represents. Then find the sum of the products. Record your answers.
Answers will vary. Possible answer is shown.

$$\underline{6} \times \underline{5} = \underline{30}$$

$$\underline{6} \times \underline{8} = \underline{48}$$

$$\underline{30} + \underline{48} = \underline{78}$$
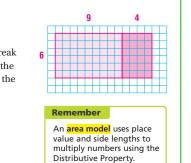
C. Model 6 × 13 again. Think of 13 as a different sum. Break apart the model to show 6 × (_____ + _____). Find the product each smaller rectangle represents. Then find the sum of the products. Record your answers.
Answers will vary. Possible answer is shown.

$$\underline{6} \times \underline{9} = \underline{54}$$

$$\underline{6} \times \underline{4} = \underline{24}$$

$$\underline{54} + \underline{24} = \underline{78}$$

Remember

An **area model** uses place value and side lengths to multiply numbers using the Distributive Property.

Chapter 3 • Lesson 5 **101**

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(ML) Multilingual Support

STRATEGY: Identify Relationships

Use visuals to help students make a connection between the collocations they encounter and the concepts they represent. Collocations are expressions with more than one word that function as a single meaning.

- Group students into teams of two or three.
- Say, **Some words work with other words to make a new meaning.**
- Write on the board: break apart, hand in, put away, talk over.
- Have students draw pictures of these four collocations to demonstrate understanding.

Draw Conclusions

1. Explain how you found the total number of squares in each model in Steps B and C.

   Possible answer: I divided the first model into a 6 × 5 rectangle and a 6 × 8 rectangle, and added: 30 + 48 = 78. Answers will vary for Step C.

2. Compare the sums of the products in Steps B and C with those of your classmates. What can you conclude?

   Possible answer: They are the same. This shows that you will get the same answer no matter how you break apart the rectangle.
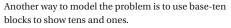
3. To find 7 × 23, is it easier to break apart the factor, 23, as 20 + 3 or 15 + 8? Explain.
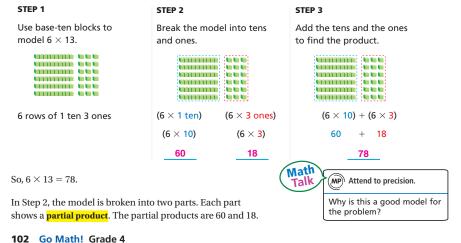
   Possible explanation: 20 + 3, because I can use mental math to multiply by multiples of 10.
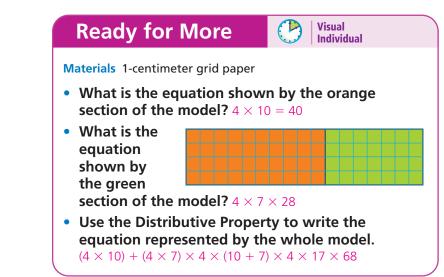
Make Connections

Another way to model the problem is to use base-ten blocks to show tens and ones.

Math Talk: Possible answer: I can break apart the model into tens and ones, and then use mental math to find the product.

STEP 1

Use base-ten blocks to model 6 × 13.

6 rows of 1 ten 3 ones

STEP 2

Break the model into tens and ones.

(6 × 1 ten)   (6 × 3 ones)
(6 × 10)   (6 × 3)
  60   **18**

STEP 3

Add the tens and the ones to find the product.

(6 × 10) + (6 × 3)
  60   +   18
       78

So, 6 × 13 = 78.

In Step 2, the model is broken into two parts. Each part shows a **partial product**. The partial products are 60 and 18.

Math Talk

MP Attend to precision.

Why is this a good model for the problem?

Ready for More

Visual / Individual

Materials 1-centimeter grid paper

- **What is the equation shown by the orange section of the model?** 4 × 10 = 40
- **What is the equation shown by the green section of the model?** 4 × 7 × 28

- **Use the Distributive Property to write the equation represented by the whole model.** (4 × 10) + (4 × 7) × 4 × (10 + 7) × 4 × 17 × 68

Draw Conclusions

Problem 1 Help students connect the models they drew to the symbolic form of the Distributive Property. For the first model:

$$6 \times 13 = 6 \times (5 + 8)$$
$$= (6 \times 5) + (6 \times 8)$$
$$= 30 + 48$$
$$= 78$$

Use Problem 3 to help students recognize that breaking apart a factor is a strategy that they can use to multiply more efficiently using mental math.

Make Connections

Students are connecting the area model they draw on grid paper to an array model using base-ten blocks. A benefit of using base-ten blocks is that the greater factor will always be broken into 10 and another addend.

- **How does Step 3 show the Distributive Property?** Possible answer: It shows that multiplication was distributed over addition.
- **Why do you think the word partial is used in the phrase *partial products*?** Possible answer: The product of each part is only part of the whole product.

To extend students' thinking, discuss why it is helpful to use parentheses in Steps 2 and 3. Give students the opportunity to explain how the problem is clarified using parentheses.

MP Attend to precision.

Math Talk Use **Math Talk** to focus on students' understanding of breaking apart a factor to make finding the product easier.

- **Is multiplying 6 by 10 easier than multiplying 6 by a number from 2 to 9? Explain.** yes; Possible explanation: You do not need to recall a basic fact when you multiply by 10. You just write a zero after 6.

Common Errors

Error Students may add a number rather than the products.

Example 6 × 13 = (6 × 10) + 3 rather than (6 × 10) + (6 × 3)
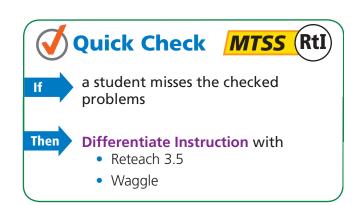
Springboard to Learning Explain that they are breaking the original multiplication problem into two products. They must have both products to add for the total.

❸ Explain

Share and Show 🔲 Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✓ **Quick Check** 🟨**MTSS** ⓇtI

If ➤ a student misses the checked problems

Then ➤ **Differentiate Instruction** with
- Reteach 3.5
- Waggle

Ⓜ🅿 **Construct arguments and critique reasoning of others.**

To extend students' thinking, ask students to describe the similarities and differences between using grid paper and using base-ten blocks. They may wish to share which method they prefer and why.

❹ Elaborate

On Your Own 🌎 Real World
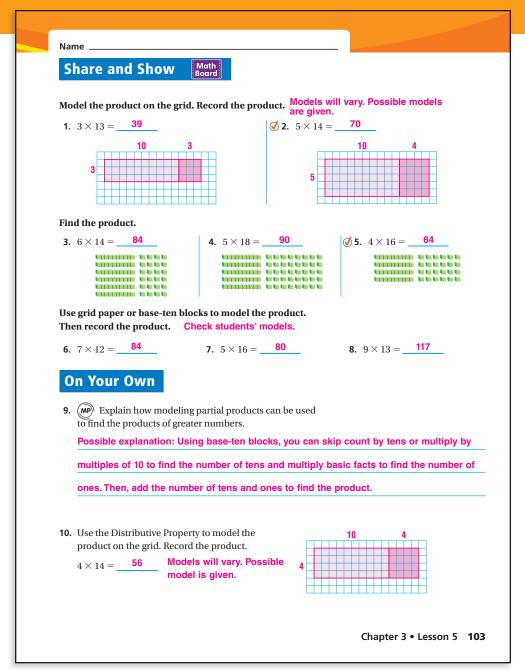
Ⓜ🅿 **Model with mathematics.**

Problem 9 This problem provides an opportunity for students to explain what they have been demonstrating with models.

Problem 10 This problem assesses students' ability to multiply and model the Distributive Property. Check that student diagrams correctly reflect the Distributive Property. If diagrams are correct and students still have the wrong answer, check for regrouping errors.

Name _____

Share and Show 🔲 Math Board

Model the product on the grid. Record the product. **Models will vary. Possible models are given.**

1. $3 \times 13 =$ __39__

   10   3

   3 ▮▮▮

2. ✓ $5 \times 14 =$ __70__

   10   4

   5 ▮▮▮

Find the product.

3. $6 \times 14 =$ __84__

4. $5 \times 18 =$ __90__

5. ✓ $4 \times 16 =$ __64__

Use grid paper or base-ten blocks to model the product. Then record the product. **Check students' models.**

6. $7 \times 12 =$ __84__

7. $5 \times 16 =$ __80__

8. $9 \times 13 =$ __117__

On Your Own

9. Ⓜ🅿 Explain how modeling partial products can be used to find the products of greater numbers.

   Possible explanation: Using base-ten blocks, you can skip count by tens or multiply by multiples of 10 to find the number of tens and multiply basic facts to find the number of ones. Then, add the number of tens and ones to find the product.

10. Use the Distributive Property to model the product on the grid. Record the product.

    $4 \times 14 =$ __56__   **Models will vary. Possible model is given.**

    10   4

    4 ▮▮▮

Meeting Individual Needs

Reteach 3.5   🟨MTSS ⓇtI1

Name _____

LESSON 3.5 Reteach

Multiply Using the Distributive Property

You can use rectangular models to multiply 2-digit numbers by 1-digit numbers.

Find 9×14.

Step 1 Draw a 9 by 14 rectangle on grid paper.

Step 2 Use the Distributive Property and products you know to break apart the model into two smaller rectangles.
Think: $14 = 10 + 4$.

Step 3 Find the product each smaller rectangle represents. $9 \times 10 = 90$ $9 \times 4 = 36$

Step 4 Find the sum of the products. $90 + 36 = 126$
So, $9 \times 14 = 126$.

Model the product on the grid. **Possible models are shown.** Record the product.

1 3×13 __39__

2 6×16 __96__

3 5×17 __85__

4 4×14 __56__

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Enrich 3.5

Name _____

LESSON 3.5 Enrich

Shading the Grids

Use the Distributive Property. Shade and label each grid.   **Models will vary. Possible models are given.**

1 Show 3×28 in two different ways.

2 Show 4×23 in two different ways.

3 **Stretch Your Thinking** Find the partial products for one of your grids in Exercise 1. Then use the Distributive Property to find the product 3×28.
Possible answer: $3 \times 20 = 60$; $3 \times 8 = 24$; using the Distributive Property, $3 \times 28 = (3 \times 20) + (3 \times 8)$; so, $3 \times 28 = 60 + 24$, or 84.

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11. Kyle went to a fruit market. The market sells a wide variety of fruits and vegetables. The picture at the right shows a display of oranges.

MATH on the ▶ Spot

Write a problem that can be solved using the picture.

Possible answers are shown.

Pose a problem.

One display can hold 8 rows of 12 oranges. If 2 rows in the display are empty, how many oranges are shown in the display?

Solve your problem.

$8 \times 12 = 96$

$2 \times 12 = 24$

$96 - 24 = 72$

or

$8 \text{ rows} - 2 \text{ rows} = 6 \text{ rows}$

$6 \text{ rows of 12 oranges} = 72 \text{ oranges}$

- Describe how you could change the problem by changing the number of rows of oranges and the number of empty spaces in the picture. Then solve the problem.

Possible answer: One display can hold 9 rows of 12 oranges. If 5 rows in the display are empty, how many oranges are shown in the display? 9 rows − 5 rows = 4 rows;

4 rows × 12 oranges = 48 oranges.

104   Go Math! Grade 4

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™

Version 2.0

Differentiated Centers Kit

Tabletop Flipchart

Mini-lessons for reteaching to targeted small groups

Readers

Supports key math skills and concepts in real-world situations.

Games

Reinforce math content and vocabulary

Activities

Meaningful and fun math practice

Problem 11 After students read the situation, discuss the information presented in the diagram. Students should identify that each of the 6 rows has 12 oranges. They should also recognize that 2 rows are empty.

Give students an opportunity to share their problems and solutions with the class.

Students should find that changing the information given in a problem will change the result.

Math on the Spot Use this video to help students model and solve this type of problem.

⑤ Evaluate | Formative Assessment

I Can Objective

Have student pairs discuss how to use the Distributive Property to demonstrate the skill for the I Can statement. Have them compare the methods they used to break up the 2-digit factor into two lesser factors.

I can use models, equations, and the Distributive Property to solve 2-digit by 1-digit multiplication problems because . . .

the Distributive Property lets me break apart the greater number as a sum of two lesser numbers. Then I can multiply each of the two lesser numbers by the 1-digit factor, using basic facts I know. Then I add these partial products to find the total product. I can draw a rectangle to help decide how to break apart the 2-digit number.

Exit Ticket
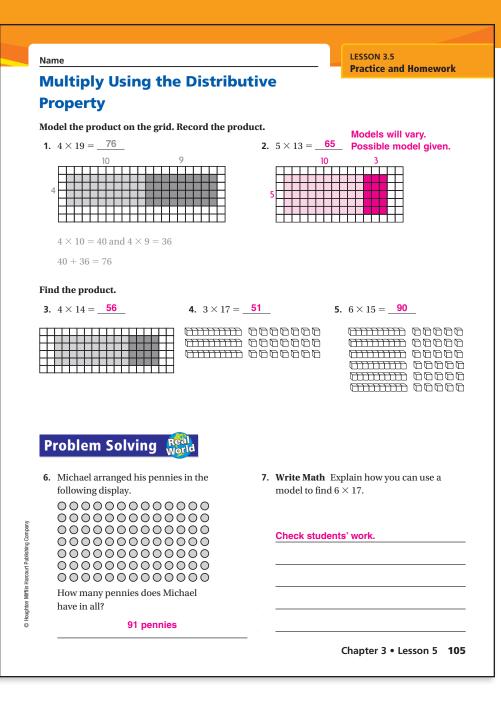
Explain how you can use a model to find 6×17.

Practice and Homework

Multiply Using the Distributive Property

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Multiply Using the Distributive Property

Model the product on the grid. Record the product.

1. $4 \times 19 =$ __76__

10   9

4

$4 \times 10 = 40$ and $4 \times 9 = 36$

$40 + 36 = 76$

2. $5 \times 13 =$ __65__   Models will vary. Possible model given.

10   3

5

Find the product.

3. $4 \times 14 =$ __56__

4. $3 \times 17 =$ __51__

5. $6 \times 15 =$ __90__

Problem Solving ·Real World·

6. Michael arranged his pennies in the following display.

How many pennies does Michael have in all?

91 pennies

7. Write Math Explain how you can use a model to find 6×17.

Check students' work.

Chapter 3 • Lesson 5   105

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Lesson Check

8. The model shows how Gig planted flowers in his garden.

How many flowers did Gig plant?

_____ **45 flowers**

9. The model below represents the expression 5×18.

How many tens will there be in the final product?

_____ **9 tens**

Spiral Review

10. Center City has a population of twenty-one thousand, seventy people. Write the population in standard form.

_____ **21,070**

11. Is the equation true or false? Explain.

$$5 \times 7 = 7 + 7 + 7 + 7 + 7 + 7 + 7$$

false; 5 × 7 is the same as 5 groups of 7 or 7 added 5 times.

12. Imelda has 5 times as many baseball cards as football cards. In all, she has 120 baseball and football cards. How many baseball cards does Imelda have?

_____ **100 baseball cards**

13. A ruby-throated hummingbird beats its wings about 53 times each second. About how many times does a ruby-throated hummingbird beat its wings in 5 seconds?

Possible estimate: about 250 times

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance
Multiply Using Expanded Form

SNAPSHOT

Mathematical Standards
- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes
- Model with mathematics.
- Attend to precision.
- Construct arguments and critique reasoning of others.
- Look for and make use of structure.

I Can Objective
I can use expanded form to multiply a multi-digit number by a 1-digit number.

Learning Goal
Use expanded form to multiply a multi-digit number by a 1-digit number.

Language Objective
Students list the steps to multiply a multi-digit number by a one-digit number using expanded form.

MATERIALS
- MathBoard
- spinner(10 section)

ACROSS THE GRADES

Before	Grade 4	After
Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability.	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.
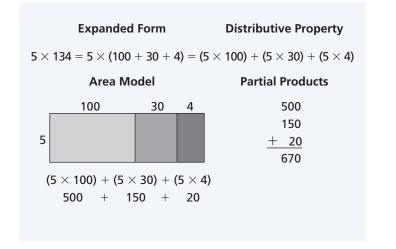
ABOUT THE MATH

Modeling Expanded Form

In this lesson, students use expanded form and the Distributive Property to multiply a multi-digit number by a 1-digit number. They use the area model representing the Distributive Property to help record the multiplication.

- Write the greater factor in expanded form, starting with the greatest place.
- Use the Distributive Property to record partial products for the area model, starting with the greatest place.
- To find the product (the total area of the model), add the partial products.

By using the area model and expanded form, students are able to gain a deeper understanding of the multiplication process.

Expanded Form   **Distributive Property**

$$5 \times 134 = 5 \times (100 + 30 + 4) = (5 \times 100) + (5 \times 30) + (5 \times 4)$$

Area Model   **Partial Products**

	100	30	4		500
5					150
					+ 20
					670

$$(5 \times 100) + (5 \times 30) + (5 \times 4)$$
$$500 \quad + \quad 150 \quad + \quad 20$$

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.6

Fiona used the Distributive Property to find the product 3×14. Write an expression that she might have used.
Possible answer: $3 \times (10 + 4)$

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder
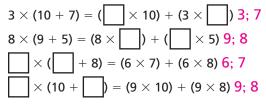
Have students practice adding multi-digit numbers using the problems below. Challenge students to complete at least four of the problems using mental math.

$239 + 509$ **748**	$7,000 + 2,130$ **9,130**
$583 + 317$ **900**	$6,324 + 842$ **7,166**
$14,926 + 3,832$ **18,758**	$738 + 741$ **1,479**
$873 + 4,893$ **5,766**	$3,751 + 5,736$ **9,487**

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Have students use the Distributive Property of Multiplication to find the unknown numbers.

$3 \times (10 + 7) = (\square \times 10) + (3 \times \square)$ **3; 7**

$8 \times (9 + 5) = (8 \times \square) + (\square \times 5)$ **9; 8**

$\square \times (\square + 8) = (6 \times 7) + (6 \times 8)$ **6; 7**

$\square \times (10 + \square) = (9 \times 10) + (9 \times 8)$ **9; 8**

- **What does the Distributive Property state?** Possible answer: Multiplying a sum by a number is the same as multiplying each addend by the number and adding the products.

① Engage

with the **Interactive Student Edition**

I Can Objective

I can use expanded form to multiply a multi-digit number by a 1-digit number.

Making Connections

Invite students to tell you what they know about multi-digit numbers.

- **What is a multi digit number?** A multi-digit number has more than one digit in the number.
- **What are examples of multi-digit numbers?** Possible answers: 18, 350, or 5,748.

Learning Activity

An airplane travels between two major cities, 277 miles apart, making 5 one-way trips each day. As part of its flight path, it flies directly over a small diner. How many miles does the airplane fly each day?

- **How many times does the airplane fly over the diner each day?** 5 times
- **How far does the airplane fly each time?** 277 miles
- **What is one way to multiply 277 by 5?** Add 5 groups of 277. $277 + 277 + 277 + 277 + 277$

② Explore

Unlock the Problem · Real World

Example 1

Work through the steps with students.

- **How can you write a number in expanded form?** Possible answer: Write the number as the sum of the value of each digit, starting with the greatest place value.

- **How do you use the Distributive Property to multiply?** Possible answer: Multiply each addend in expanded form by the 1-digit number. Then add the partial products.

(MP) Attend to precision.

- **How does the model relate to the Distributive Property?** Possible answer: Each rectangle represents multiplying an addend in expanded form by the 1-digit number.

- **Why do you add in Step 4?** Possible answer: After I find each partial product, I need to add the partial products to find the answer.
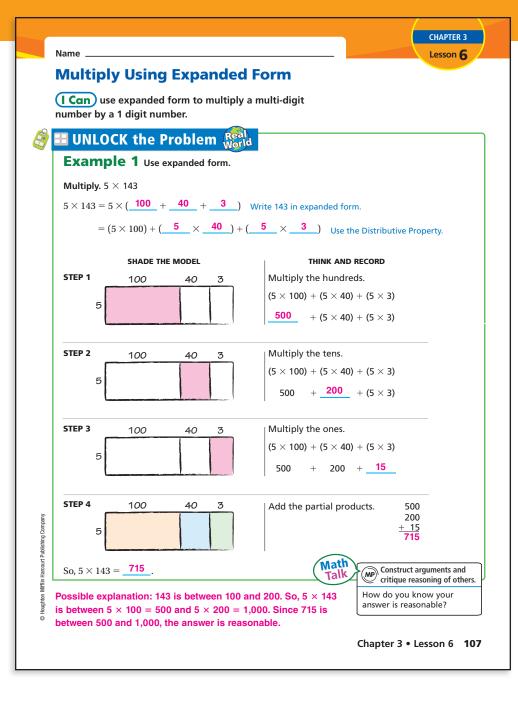
(MP) Construct arguments and critique reasoning of others.

Math Talk Use **Math Talk** to focus on students' understanding of how to check the reasonableness of their answer.

- **To check the reasonableness of an answer, do you need to find an exact number, or is an estimate enough?** An estimate is enough.

(MP) Look for and make use of structure.

- **How would the work have been different if 143 had been 103?** Possible answer: The expanded form of the 3-digit factor would have had only hundreds and ones. So, the model would have had only two parts, and there would have been only two partial products to add.

Name _____

Multiply Using Expanded Form

I Can use expanded form to multiply a multi-digit number by a 1 digit number.

⊞ UNLOCK the Problem · Real World

Example 1 Use expanded form.

Multiply. 5×143

$5 \times 143 = 5 \times (\underline{100} + \underline{40} + \underline{3})$ Write 143 in expanded form.

$= (5 \times 100) + (\underline{5} \times \underline{40}) + (\underline{5} \times \underline{3})$ Use the Distributive Property.

SHADE THE MODEL	THINK AND RECORD
STEP 1 100 40 3 5	Multiply the hundreds. $(5 \times 100) + (5 \times 40) + (5 \times 3)$ $\underline{500}$ $+ (5 \times 40) + (5 \times 3)$
STEP 2 100 40 3 5	Multiply the tens. $(5 \times 100) + (5 \times 40) + (5 \times 3)$ 500 $+ \underline{200} + (5 \times 3)$
STEP 3 100 40 3 5	Multiply the ones. $(5 \times 100) + (5 \times 40) + (5 \times 3)$ $500 + 200 + \underline{15}$
STEP 4 100 40 3 5	Add the partial products. 500 200 $+\ 15$ $\overline{715}$

So, $5 \times 143 = \underline{715}$.

Math Talk **(MP) Construct arguments and critique reasoning of others.** How do you know your answer is reasonable?

Possible explanation: 143 is between 100 and 200. So, 5×143 is between $5 \times 100 = 500$ and $5 \times 200 = 1,000$. Since 715 is between 500 and 1,000, the answer is reasonable.

Chapter 3 • Lesson 6   **107**

ⓂⓁ Multilingual Support

STRATEGY: Frontload

Write on the board: *expanded* and *partial*.

- Ask students what comes to mind when they hear the word *expand*. Write the responses on the board. Possible examples: a peacock's tail feathers, a fan

- Do the same with the word *partial*. Possible examples: partial loaf of bread, partial deck of cards

- Put students with partners. Have them come up with other examples together.

Example 2 Use expanded form.

The gift shop at the animal park orders 3 boxes of toy animals. Each box has 1,250 toy animals. How many toy animals does the shop order?

Multiply. $3 \times 1,250$

STEP 1

Write 1,250 in expanded form. Use the Distributive Property.

$3 \times 1,250 = 3 \times (\underline{1,000} + \underline{200} + \underline{50})$

$= (3 \times 1,000) + (\underline{3} \times \underline{200}) + (\underline{3} \times \underline{50})$

STEP 2

Add the partial products.

$$\begin{array}{r} 3,000 \\ 600 \\ + \quad 150 \\ \hline 3,750 \end{array}$$

So, the shop ordered __3,750__ animals.

Share and Show Math Board

1. Find 4×213. Use expanded form.

```
      200    10   3
  4 [        ][  ][ ]
```

$$\begin{array}{r} 800 \\ 40 \\ + \quad 12 \\ \hline 852 \end{array}$$

$4 \times 213 = \underline{4} \times (\underline{200} + \underline{10} + \underline{3})$

$= (\underline{4} \times \underline{200}) + (\underline{4} \times \underline{10}) + (\underline{4} \times \underline{3})$ — Use the Distributive Property.

$= \underline{800} + \underline{40} + \underline{12}$

$= \underline{852}$

Record the product. Use expanded form to help.

☑ **2.** $4 \times 59 = \underline{236}$ ☑ **3.** $3 \times 288 = \underline{864}$

Math Talk

MP Attend to precision.

How did using the Distributive Property make finding the product easier?

Possible explanation: Breaking apart the greater factor into its expanded form makes using the Distributive Property easier.

Ready for More ⏱ | Visual Partners

Materials Spinner (10-section)

- Have students label a 10-section spinner from 0–9.
- Students can spin the pointer four times to make a 3-digit by 1-digit multiplication problem.
- One student estimates the product. The other student uses expanded form to multiply.
- Students compare the estimate to the product to check for reasonableness.
- Then have students switch roles and solve a new multiplication problem.

Example 2

Read and discuss the problem. Then work through the example with students.

- **When writing 1,250 in expanded form, why do you not write anything for the ones place?** Possible answer: The value of the ones digit is zero. Adding zero does not change the sum of the partial products, so I do not need to include it.
- **How is multiplying by a 3-digit number similar to multiplying by a 4-digit number using expanded form?** Possible answer: The steps are the same, but you may have more or fewer partial products.
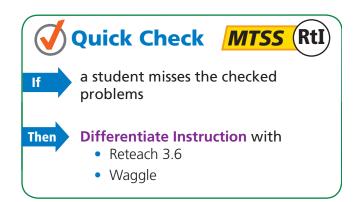
③ Explain

Share and Show Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

MP Attend to precision.

Math Talk Use **Math Talk** to help students recognize that breaking a number apart into its expanded form is a method used for finding a product more easily.

- **How do the digits in the factors 59 and 288 compare to the digits in each part of their expanded forms?** Possible answer: 59 and 288 have 2 and 3 digits that are not zero. Each part of their expanded forms has only one of these nonzero digits.

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

☑ Quick Check MTSS RtI

If ▶ a student misses the checked problems

Then ▶ **Differentiate Instruction** with
  - Reteach 3.6
  - Waggle

④ Elaborate

On Your Own

If students complete the checked problems correctly, they may continue with the remaining problems.

Problems 4–9 Students use expanded form. Have students estimate to check the reasonableness of their answer.

(MP) Model with mathematics.

Problem 10 Students are required to write an expression to model using expanded form to multiply.

Problem 11 This is a multi-step problem. After students multiply to find the total tacks bought, they need to subtract the number of tacks used to put up posters. Remind students to read the problem carefully to identify what information to use in each step of the solution.

(MP) Look for and make use of structure.

- **How can you use expanded form to find the product of a 1-digit number and a 6-digit number?** Possible answer: Write the 6-digit number in expanded form. Use the Distributive Property to multiply each addend by the 1-digit number, and then add the partial products to find the product.

On Your Own

Record the product. Use expanded form to help.

4. $4 \times 21 =$ ___**84**___

5. $6 \times 35 =$ ___**210**___

6. A hotel has 128 rooms on each floor. There are 4 floors in all. If 334 of the rooms in the hotel have been cleaned, how many rooms still need to be cleaned?

178 rooms

7. Ben wants to buy 2 blue sweaters for $19 each and 3 brown sweaters for $44 each. How much will Ben spend on the five sweaters?

$170

8. A jeweler has 36 inches of silver chain. She needs 5 times that much to make some necklaces and 3 times that amount to make some bracelets. How much silver chain does the jeweler need to make her necklaces and bracelets?

288 inches

9. Naveena walks her dog 3 times a day. Each time she walks her dog, she walks 1,760 yards. How many yards does she walk her dog in 3 days?

15,840 yards

10. (MP) What expression could you write to show how to multiply 9×856 using place value and expanded form?

$(9 \times 800) + (9 \times 50) + (9 \times 6)$

11. Lupita bought 4 packages of tacks. There are 48 tacks in a package. She used 160 of the tacks to put up posters. How many tacks does she have left? Explain.

32 tacks; possible explanation: I multiplied 4×48 to find how many tacks Lupita bought; 192. Then I subtracted 160 from 192 to find how many tacks Lupita has left; $192 - 160 = 32$.

Show the Math
Demonstrate Your Thinking

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⚠ Common Errors

Error Students may forget to multiply the 1-digit number by each addend when using the Distributive Property.

Example $3 \times 288 = 3 \times (200 + 80 + 8) = (3 \times 200) + (3 \times 8)$

Springboard to Learning Tell students to underline each addend after they write it using the Distributive Property. $3 \times 288 = 3 \times (\underline{200} + \underline{80} + \underline{8}) = (3 \times \underline{200}) + (3 \times \underline{80}) + (3 \times \underline{8})$

Meeting Individual Needs

Reteach 3.6   MTSS (RtI1)

Multiply Using Expanded Form

You can use expanded form or a model to find products.
Multiply. 3×26

Think and Write	Use a Model
Step 1 Write 26 in expanded form. $26 = 20 + 6$ $3 \times 26 = 3 \times (20 + 6)$	**Step 1** Show 3 groups of 26.
Step 2 Use the Distributive Property. $3 \times 26 = (3 \times 20) + (\underline{3} \times \underline{6})$	**Step 2** Break the model into tens and ones.
Step 3 Multiply the tens. Multiply the ones. $3 \times 26 = (3 \times 20) + (3 \times 6)$ $= \underline{60} + \underline{18}$	$(3 \times 2 \text{ tens})$ $(3 \times 6 \text{ ones})$ (3×20) (3×6) $\underline{60}$ $\underline{18}$
Step 4 Add the partial products. $\begin{array}{r}60\\+18\\\hline 78\end{array}$	**Step 3** Add to find the total product. $\underline{60} + \underline{18} = \underline{78}$

So, $3 \times 26 = \underline{78}$.

Record the product. Use expanded form to help.

1 $6 \times 14 =$ ___84___
$6 \times (10 + 4)$
$(6 \times 10) + (6 \times 4)$

	6	0
+	2	4
	8	4

2 $4 \times 52 =$ ___208___
$4 \times (50 + 2)$
$(4 \times 50) + (4 \times 2)$

	2	0	0
+			8
	2	0	8

3 $5 \times 162 =$ ___810___
$5 \times (100 + 60 + 2)$
$(5 \times 100) + (5 \times 60) + (5 \times 2)$

	5	0	0
	3	0	0
+		1	0
	8	1	0

4 $3 \times 279 =$ ___837___
$3 \times (200 + 70 + 9)$
$(3 \times 200) + (3 \times 70) + (3 \times 9)$

	6	0	0
	2	1	0
+		2	7
	8	3	7

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Enrich 3.6

Expanded Form Match-Up

Write the multiplication expression for each expanded form. Then match the multiplication expression with its product.

1 $(7 \times 900) + (7 \times 80) + (7 \times 7)$
___7×987; D___

A. 15,144

B. 7,065

2 $(3 \times 5,000) + (3 \times 40) + (3 \times 8)$
___$3 \times 5,048$; A___

C. 15,720

D. 6,909

3 $(8 \times 900) + (8 \times 2)$
___8×902; H___

E. 16,224

4 $(4 \times 3,000) + (4 \times 900) + (4 \times 60) + (4 \times 2)$
___$4 \times 3,962$; F___

F. 15,848

G. 7,360

5 $(2 \times 7,000) + (2 \times 800) + (2 \times 6)$
___$2 \times 7,806$; I___

H. 7,216

I. 15,612

6 $(9 \times 700) + (9 \times 80) + (9 \times 5)$
___9×785; B___

J. 14,172

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Problem Solving · Applications — Real World

Use the table for 12–13.

Sacco Nursery Plant Sale Prices per Tree		
Tree	Regular Price	Discounted Price (4 or more)
Flowering Cherry	$59	$51
Italian Cypress	$79	$67
Muskogee Crape Myrtle	$39	$34
Royal Empress	$29	$25

12. What is the total cost of 3 Italian cypress trees?

$237

13. Tanya says that the difference in the cost of 4 flowering cherry trees and 4 Muskogee crape myrtles is $80. Is she correct? Explain.

MATH on the ▶ Spot

No. Possible explanation: Tanya used the regular price rather than using the discounted price to get her answer.

Show the Math

Demonstrate Your Thinking

14. Write Math What is the greatest possible product of a 2-digit number and a 1-digit number? Explain how you know.

891; possible explanation: 99 is the greatest 2-digit number and 9 is the greatest 1-digit number. 99 × 9 = 891

15. Multiply 5 × 381 using place value and expanded form. Select a number from each box to complete the expression.

$$(5 \times \boxed{\begin{array}{c}30\\ \underline{300}\end{array}}) + (5 \times \boxed{\begin{array}{c}\underline{8}\\ 80\end{array}}) + (5 \times \boxed{\begin{array}{c}\underline{1}\\ 10\end{array}})$$

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™
Version 2.0
Differentiated Centers Kit

Tabletop Flipchart
Mini-lessons for reteaching to targeted small groups

Readers
Supports key math skills and concepts in real-world situations.

Games
Reinforce math content and vocabulary

Activities
Meaningful and fun math practice

Problem Solving Applications — Real World

Problem 12 This is a one-step problem that requires students to use data from the table.

(MP) Model with mathematics.

Problem 13 Students are required to use higher order thinking skills as they evaluate if Tanya's statement is correct. This is a multi-step problem requiring students to gather the correct information from the table.

- **What is the correct answer using the discounted prices?** $68

Math on the Spot Use this video to help students model and solve this type of problem.

Problem 15 Students will be using the Distributive Property to break 381 into three numbers that are easier to multiply. Students should recognize that the numbers they choose should represent 381 in expanded form. Using the expanded form of notation should enable students to compute mentally to check their work.

5 Evaluate | Formative Assessment

I Can Objective

Have students list steps to demonstrate the skill for the I Can statement.

I can use expanded form to multiply a multi-digit number by a 1-digit number by . . . first writing the greater factor in expanded form. Then I can use the Distributive Property to multiply each addend by the 1-digit number and add the partial products to find the product.

Exit Ticket

Explain how you can find 3 × 584 using expanded form.

Practice and Homework

Multiply Using Expanded Form

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Multiply Using Expanded Form

Record the product. Use expanded form to help.

1. $7 \times 14 =$ _____**98**_____

$7 \times 14 = 7 \times (10 + 4)$

$\qquad = (7 \times 10) + (7 \times 4)$

$\qquad = 70 + 28$

$\qquad = 98$

2. $8 \times 43 =$ _____**344**_____

3. $6 \times 532 =$ _____**3,192**_____

4. $5 \times 923 =$ _____**4,615**_____

Problem Solving · Real World

5. The fourth-grade students at Riverside School are going on a field trip. There are 68 students on each of the 4 buses. How many students are going on the field trip?

    _____**272 students**_____

6. There are 5,280 feet in one mile. Fatima likes to walk 5 miles each week for exercise. How many feet does Fatima walk each week?

    _____**26,400 feet**_____

7. **Write Math** Explain how you can find 3×584 using expanded form.

    _____**Check students' work.**_____

    _____

    _____

Lesson Check

8. Write an expression that shows how to multiply 7×256 using expanded form and the Distributive Property.

(7 × 200) + (7 × 50) + (7 × 6)

9. Sue uses the expression $(8 \times 3,000) + (8 \times 200) + (8 \times 9)$ to help solve a multiplication problem. What is Sue's multiplication problem?

8 × 3,209

Spiral Review

10. What is another way to write 9×200?

Possible answer: 18 hundreds

11. What is the value of the digit 4 in 46,000?

Possible answer: 4 ten thousands

12. Zaide bought 6 packages of napkins for his restaurant. There were 200 napkins in each package. How many napkins did Zaide buy?

1,200 napkins

13. List these numbers in order from **least** to **greatest**.

8,251; 8,125; 8,512

8,125; 8,251; 8,512

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance

Multiply Using Partial Products

SNAPSHOT

Mathematical Standards

- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes

- Attend to precision.
- Look for and make use of structure.
- Model with mathematics.
- Construct arguments and critique reasoning of others.

(I Can) Objective

I can use different strategies such as place value and partial products to multiply by a 1-digit number.

Learning Goal

Use place value and partial products to multiply a multi-digit number by a 1-digit number.

Language Objective

Student pairs explain to each other how to use place value and partial products to multiply by a 1-digit number.

MATERIALS

- MathBoard

ACROSS THE GRADES

Before	Grade 4	After
Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability.	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.

ABOUT THE MATH

Using Area Models

Students have used the area model to help them multiply using expanded form. In this lesson, students use the area model to connect place value and multiplication.

- Students have written the expanded form for a number starting with the greatest place and have multiplied starting with the greatest place.
- This lesson shows students how to multiply and record partial products for the area model starting with the greatest place.
- While partial products can be written in any order, it is easier for students to connect the recording to the area model if they start with the greatest place.

Expanded Form and Partial Products

$$6 \times 182 = 6 \times (100 + 80 + 2)$$
$$= (6 \times 100)$$
$$+ (6 \times 80)$$
$$+ (6 \times 2)$$
$$= 600 + 480 + 12$$
$$= 1,092$$

Place Value and Partial Products

$$\begin{array}{r} 182 \\ \times\ \ 6 \\ \hline 600 \leftarrow 6 \times 1 \text{ hundred} \\ 480 \leftarrow 6 \times 8 \text{ tens} \\ +\ \ 12 \leftarrow 6 \times 2 \text{ ones} \\ \hline 1,092 \end{array}$$

Area Model

	100	80	2
6	6×100	6×80	6×2

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.7

Tabitha runs 34 miles every week. How many miles will she run in a month? (Assume there are 4 weeks in a month.) 136 miles

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Have students practice basic facts by finding the unknown factor.

$9 \times \blacksquare = 27$ **3** $8 \times \blacksquare = 32$ **4** $3 \times \blacksquare = 15$ **5**

$5 \times \blacksquare = 35$ **7** $7 \times \blacksquare = 21$ **3** $2 \times \blacksquare = 14$ **7**

$4 \times \blacksquare = 12$ **3** $\blacksquare \times 9 = 63$ **7** $\blacksquare \times 9 = 81$ **9**

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Ask two students to come to the board and model 2×128. One student draws a sketch of a rectangular model. The other student draws a quick picture for base-ten blocks.

- **How do you break the numbers apart before you start either model?** You break the greater factor into its expanded form: $100 + 20 + 8$.

- **How are these drawings the same?** Possible answer: They both show two sets of 1 hundred, 2 tens, and 8 ones.

Ask student volunteers to explain each part of their models.

① Engage

with the Interactive Student Edition

I Can Objective

I can use different strategies such as place value and partial products to multiply by a 1-digit number.

Making Connections

Invite students to tell you what they know about 3-digit numbers.

- **What are examples of 3-digit numbers in the real-world?** Possible answers: number of students in a school, temperature of an oven

- **125 is a 3-digit number. Where would the 5 go in a place-value chart?** ones

- **Where would the 2 go?** tens

- **What about the 1?** hundreds

Learning Activity

A flower garden is being expanded to add 7 rows for new seedlings. Each of the new rows will have 137 seedlings. How many new seedlings will be planted in the garden?

- **How many rows of seedlings are going to be planted in the flower garden?** 7 rows

- **How many seedlings will be in each row?** 137 seedlings

- **What is one way to multiply 137 by 7?** Add 7 groups of 137. $137 + 137 + 137 + 137 + 137 + 137 + 137$

2 Explore

Unlock the Problem

Students connect place value and the Distributive Property to recording partial products. The rectangular model is visually related to the Distributive Property. When students show the partial products for a multiplication example, they can start with any place. However, mathematical convention suggests that you start with the greatest place, in this case the hundreds place. This also visually relates to the Distributive Property that is written starting with the greatest place.

- **Why are you multiplying the hundreds first?** Since the model is arranged from left to right, I multiply the hundreds first.
- **What is the value of the digit 1 in 182?** 100
- **Are you multiplying 6 × 1 or 6 × 100?** 6 × 100
- **What is the value of the digit 8 in 182?** 80
- **What factors are you multiplying when you multiply the tens?** 6 × 80
- **When do you regroup?** When I add the partial products.
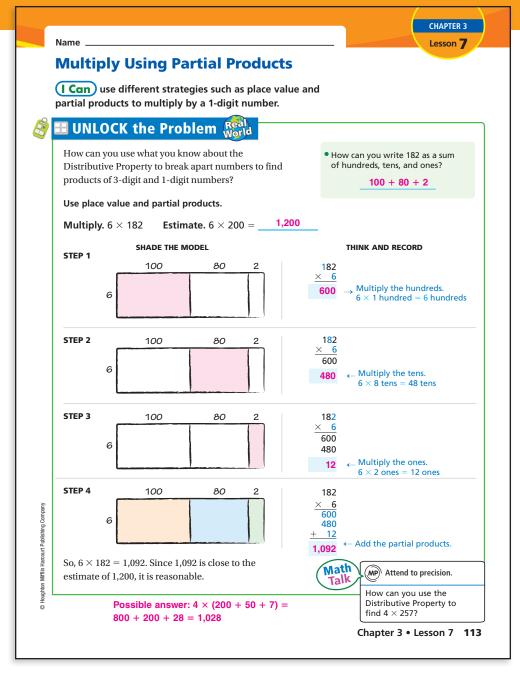
After students complete the steps, compare the final answer to the estimate.

(MP) **Attend to precision.**

Math Talk Use **Math Talk** to focus on students' understanding of using the Distributive Property to find a product.

- **What is the first step?** Break apart 257 into hundreds, tens, and ones.
- **What would you do with the parts of 257?** Multiply each part by 4.
- **What is the last step?** Add the partial products.

Name _____

Multiply Using Partial Products

(**I Can**) use different strategies such as place value and partial products to multiply by a 1-digit number.

⊞ UNLOCK the Problem (Real World)

How can you use what you know about the Distributive Property to break apart numbers to find products of 3-digit and 1-digit numbers?

- How can you write 182 as a sum of hundreds, tens, and ones?

  100 + 80 + 2

Use place value and partial products.

Multiply. 6 × 182   **Estimate.** 6 × 200 = ___1,200___

SHADE THE MODEL	THINK AND RECORD
STEP 1	$\begin{array}{r} 182 \\ \times\ 6 \\ \hline 600 \end{array}$ → Multiply the hundreds. 6 × 1 hundred = 6 hundreds
STEP 2	$\begin{array}{r} 182 \\ \times\ 6 \\ \hline 600 \\ 480 \end{array}$ ← Multiply the tens. 6 × 8 tens = 48 tens
STEP 3	$\begin{array}{r} 182 \\ \times\ 6 \\ \hline 600 \\ 480 \\ 12 \end{array}$ ← Multiply the ones. 6 × 2 ones = 12 ones
STEP 4	$\begin{array}{r} 182 \\ \times\ 6 \\ \hline 600 \\ 480 \\ +\ 12 \\ \hline 1,092 \end{array}$ ← Add the partial products.

So, 6 × 182 = 1,092. Since 1,092 is close to the estimate of 1,200, it is reasonable.

Math Talk

(MP) Attend to precision.

How can you use the Distributive Property to find 4 × 257?

Possible answer: 4 × (200 + 50 + 7) = 800 + 200 + 28 = 1,028

Chapter 3 • Lesson 7   113

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(ML) ## Multilingual Support

STRATEGY: Cooperative Grouping

Write on the board 134 + 95, 4 × 95, *product*, and *sum*.

- Say, **Both of these math words are the answer to a math problem. One word is used when doing addition and the other when doing multiplication.**
- Group students into small groups. Have students look up both words in the glossary, discuss when to use each word, and then write a sentence to demonstrate understanding.

Example

Use place value and partial products.

Multiply. $2 \times 4,572$ **Estimate.** $2 \times 5,000 =$ __10,000__

$$
\begin{array}{r}
4,572 \\
\times \quad 2 \\
\hline
\mathbf{8,000} \\
\mathbf{1,000} \\
\mathbf{140} \\
+ \quad \mathbf{4} \\
\hline
\mathbf{9,144}
\end{array}
$$

← 2×4 thousands = 8 thousands
← 2×5 hundreds = 1 thousand
← 2×7 tens = 1 hundred 4 tens
← 2×2 ones = 4 ones
← Add the partial products.

Share and Show [Math Board]

1. Use the model to find 2×137.

100	30	7

$$
\begin{array}{r}
137 \\
\times \quad 2 \\
\hline
\mathbf{200} \\
\mathbf{60} \\
+ \quad \mathbf{14} \\
\hline
\mathbf{274}
\end{array}
$$

Estimate. Then record the product.   **Possible estimates are given.**

2. Estimate: __600__

$$
\begin{array}{r}
190 \\
\times \quad 3 \\
\hline
\mathbf{300} \\
\mathbf{270} \\
+ \quad \mathbf{0} \\
\hline
\mathbf{570}
\end{array}
$$

☑ **3.** Estimate: __2,000__

$$
\begin{array}{r}
471 \\
\times \quad 4 \\
\hline
\mathbf{1,600} \\
\mathbf{280} \\
+ \quad \mathbf{4} \\
\hline
\mathbf{1,884}
\end{array}
$$

☑ **4.** Estimate: __$21,000__

$$
\begin{array}{r}
\$3,439 \\
\times \quad 7 \\
\hline
\mathbf{21,000} \\
\mathbf{2,800} \\
\mathbf{210} \\
+ \quad \mathbf{63} \\
\hline
\mathbf{\$24,073}
\end{array}
$$

Possible explanation: Using expanded form results in products that can be found mentally.

Math Talk (MP) **Construct arguments and critique reasoning of others.**
Explain how using place value and expanded form makes it easier to find products.

Ready for More   🕐 | Visual
Individual

- Challenge students to practice multiplying 3-digit numbers.
- Give students the problems shown below.
- Have students use the digits given to the left of the problems to fill in the missing digits in the multiplication problems.

1. 5, 4, and 3   __5__ × __3__ __4__ 2 = 1,710

2. 8, 4, and 1   __4__ × 3 __8__ __1__ = 1,524

3. 2, 9, and 6   __6__ × __2__ 7 __9__ = 1,674

Example

When multiplying with 4-digit numbers as in the example, have students tell what factors are being multiplied for each partial product.
$2 \times 4,000, \ 2 \times 500, \ 2 \times 70, \ 2 \times 2$
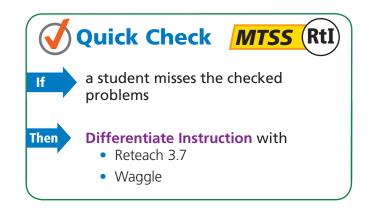
❸ Explain

Share and Show [Math Board]

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

(MP) **Construct arguments and critique reasoning of others.**

Math Talk Use **Math Talk** to focus on students' understanding of how using place value and expanded form helps to make multiplication easier.

- **What method can you use to find the partial products when you use expanded form?** Possible answer: mental math

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✓ Quick Check   [MTSS] [RtI]

If ➤ a student misses the checked problems

Then ➤ **Differentiate Instruction** with
- Reteach 3.7
- Waggle

④ Elaborate

On Your Own
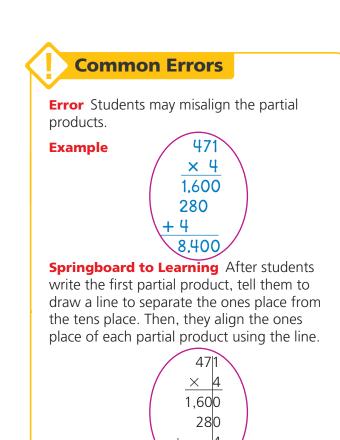
If students complete the checked problems correctly, they may continue with the remaining problems.

(MP) Look for and make use of structure.

Problems 12–15 Students are required to use higher order thinking skills as they identify the missing digit. You may wish to encourage students to write the partial products as they work to help them find the missing digit.

- **How can estimation help you solve Problem 14?** I can round both the factor and the product to the nearest hundred. Then I can find what number times 400 equals 2,400.

Students can use patterns or mental math to determine the factor is 6.
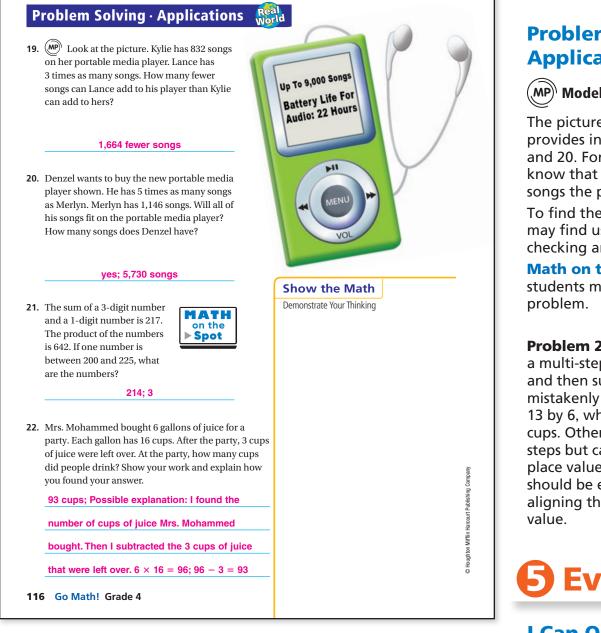
⚠ **Common Errors**

Error Students may misalign the partial products.

Example

$$\begin{array}{r} 471 \\ \times\ \ 4 \\ \hline 1,600 \\ 280 \\ +\ \ \ 4 \\ \hline 8,400 \end{array}$$

Springboard to Learning After students write the first partial product, tell them to draw a line to separate the ones place from the tens place. Then, they align the ones place of each partial product using the line.

$$\begin{array}{r} 47|1 \\ \times\ \ |4 \\ \hline 1,60|0 \\ 28|0 \\ +\ \ \ |4 \\ \hline 1,88|4 \end{array}$$

Name _____

On Your Own

Estimate. Then record the product. Possible estimates are given.

5. Estimate: __$200__

$$\begin{array}{r} \$53 \\ \times\ \ \ 4 \\ \hline 200 \\ +\ \ \ 12 \\ \hline \$212 \end{array}$$

6. Estimate: __$4,500__

$$\begin{array}{r} \$473 \\ \times\ \ \ \ 9 \\ \hline 3,600 \\ 630 \\ +\ \ \ \ 27 \\ \hline \$4,257 \end{array}$$

7. Estimate: __3,600__

$$\begin{array}{r} 608 \\ \times\ \ \ \ 6 \\ \hline 3,600 \\ 0 \\ +\ \ \ \ 48 \\ \hline 3,648 \end{array}$$

Practice: Copy and Solve Estimate. Then record the product.

Possible estimates are given.

8. 2×78
160; 156

9. $2 \times \$210$
$400; $420

10. $9 \times \$682$
$6,300; $6,138

11. $8 \times 8,145$
64,000; 65,160

(MP) Find the missing digit.

12.
$$\begin{array}{r} \mathbf{6}\ 5 \\ \times\ \ 7 \\ \hline 455 \end{array}$$

13.
$$\begin{array}{r} 248 \\ \times\ \ \ 3 \\ \hline \mathbf{7}\ 44 \end{array}$$

14.
$$\begin{array}{r} \$395 \\ \times\ \ \ \mathbf{6} \\ \hline \$2,370 \end{array}$$

15.
$$\begin{array}{r} 3,748 \\ \times\ \ \ \ 4 \\ \hline 1\mathbf{4},992 \end{array}$$

16. A store bought 9 cases of light bulbs in May and 8 cases in June. There are 48 light bulbs in a case. How many light bulbs did the store buy in May and June?

816 light bulbs

17. Mr. Yilmaz saved $2,500 to buy airline tickets for his family. He bought 6 airline tickets for $372 each. How much of the money he saved does Mr. Yilmaz have after he buys the tickets?

$268

18. Coach Ramirez bought 8 cases of bottled water for a road race. There are 24 bottles in each case. After the race, 34 bottles of water were left. How many bottles were used at the race? Explain.

158 bottles; Possible explanation: I first found out how many bottles of water were bought; 8 × 24 = 192. There were 34 bottles left over, so I subtracted 34 from 192 to find the number of bottles used; 192 − 34 = 158.

Chapter 3 • Lesson 7   **115**

Meeting Individual Needs

Reteach 3.7   MTSS (RtI1)

Multiply Using Partial Products

Use partial products to multiply.
Multiply. 7 × $332

Step 1 Estimate the product.   332 rounds to 300; 7 × $300 = __$2,100__

Step 2 Multiply the 3 hundreds, or 300, by 7.

$$\begin{array}{r} \$332 \\ \times\ \ 7 \end{array} \quad \text{or} \quad \begin{array}{r} \$300 \\ \times\ \ 7 \\ \hline \$2,100 \end{array}$$

Step 3 Multiply the 3 tens, or 30, by 7.

$$\begin{array}{r} \$332 \\ \times\ \ 7 \end{array} \quad \text{or} \quad \begin{array}{r} \$30 \\ \times\ \ 7 \\ \hline \$210 \end{array}$$

Step 4 Multiply the 2 ones, or 2, by 7.

$$\begin{array}{r} \$332 \\ \times\ \ 7 \end{array} \quad \text{or} \quad \begin{array}{r} \$2 \\ \times\ \ 7 \\ \hline \$14 \end{array}$$

Step 5 Add the partial products. $2,100 + $210 + $14 = __$2,324__

So, 7 × $332 = $2,324. Since $2,324 is close to the estimate of $2,100, it is reasonable.

Estimate. Then record the product.   Possible estimates are given.

1 Estimate: __400__
$$\begin{array}{r} 181 \\ \times\ 2 \\ \hline 362 \end{array}$$

2 Estimate: __800__
$$\begin{array}{r} 156 \\ \times\ 4 \\ \hline 624 \end{array}$$

3 Estimate: __$1,000__
$$\begin{array}{r} \$210 \\ \times\ 5 \\ \hline \$1,050 \end{array}$$

4 Estimate: __1,800__
$$\begin{array}{r} 303 \\ \times\ 6 \\ \hline 1,818 \end{array}$$

5 Estimate: __$800__
$$\begin{array}{r} \$427 \\ \times\ 2 \\ \hline \$854 \end{array}$$

6 Estimate: __$2,000__
$$\begin{array}{r} \$367 \\ \times\ 5 \\ \hline \$1,835 \end{array}$$

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Enrich 3.7

Shaping Factors

Choose one number from a circle and another number from a triangle. Then use these two numbers to write an equation that is true. You can use numbers more than once.   Possible answers are given.

1 Find the least product.
2 × 120 = 240

2 Find the greatest product.
9 × $583 = $5,247

3 Find the product closest to 1,050.
7 × 149 = 1,043

4 Find a product with an 8 in the ones place.
8 × $421 = $3,368

5 Find the greatest product ending in 25.
9 × 125 = 1,125

6 Find a product between 1,500 and 1,700.
4 × $421 = $1,684

7 Find a product that contains only the digits 2 and 9.
8 × $374 = $2,992

8 Find the product with three zeros.
8 × 125 = 1,000

9 Find the product closest to 500.
4 × 125 = 500

10 Find the product closest to 2,000.
5 × $421 = $2,105

(8) (5)
($421) (2)
($583) (4)
(149) (125)
(9) (120)
($374) (7)

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115   Go Math! Grade 4

19. (MP) Look at the picture. Kylie has 832 songs on her portable media player. Lance has 3 times as many songs. How many fewer songs can Lance add to his player than Kylie can add to hers?

_____ **1,664 fewer songs** _____

20. Denzel wants to buy the new portable media player shown. He has 5 times as many songs as Merlyn. Merlyn has 1,146 songs. Will all of his songs fit on the portable media player? How many songs does Denzel have?

_____ **yes; 5,730 songs** _____

Up To 9,000 Songs
Battery Life For Audio: 22 Hours

MENU
VOL

21. The sum of a 3-digit number and a 1-digit number is 217. The product of the numbers is 642. If one number is between 200 and 225, what are the numbers?

MATH on the ▶ Spot

_____ **214; 3** _____

Show the Math
Demonstrate Your Thinking

22. Mrs. Mohammed bought 6 gallons of juice for a party. Each gallon has 16 cups. After the party, 3 cups of juice were left over. At the party, how many cups did people drink? Show your work and explain how you found your answer.

93 cups; Possible explanation: I found the

number of cups of juice Mrs. Mohammed

bought. Then I subtracted the 3 cups of juice

that were left over. 6 × 16 = 96; 96 − 3 = 93

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Problem Solving Applications Real World

(MP) **Model with mathematics.**

The picture of the portable media player provides information needed for Problems 19 and 20. For Problem 20, it is important to know that there is a limit to the number of songs the player can hold.

To find the numbers in Problems 21, students may find using reasoning and guessing and checking are helpful strategies.

Math on the Spot Use this video to help students model and solve this type of problem.

Problem 22 Students should recognize this as a multi-step problem involving multiplication and then subtraction. Some students may mistakenly subtract first, and thereby multiply 13 by 6, which will achieve an answer of 78 cups. Other students might follow the correct steps but calculate incorrectly. Students using place value and partial products to multiply should be encouraged to make sure they are aligning the digits in the appropriate place value.

5 Evaluate | Formative Assessment

I Can Objective

Have student pairs explain to each other in order to demonstrate the skill for the I Can statement.

I can use different strategies such as place value and partial products to multiply by a 1-digit number. To do this I can . . . first break apart the greater number into thousands, hundreds, tens, and ones. Then I can multiply each part by the other factor. Finally, I can add the partial products.
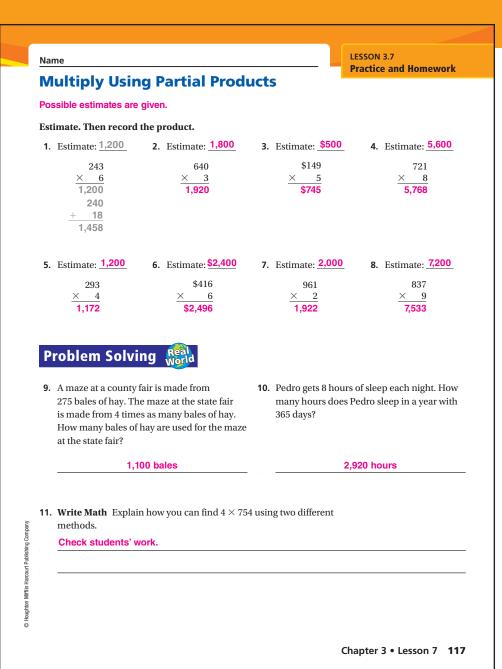
Exit Ticket

Explain how you can find 4 × 754 using two different methods.

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™
Version 2.0
Differentiated Centers Kit

Tabletop Flipchart

Mini-lessons for reteaching to targeted small groups

Readers

Supports key math skills and concepts in real-world situations.

Games

Reinforce math content and vocabulary

Activities

Meaningful and fun math practice

Practice and Homework

Multiply Using Partial Products

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Multiply Using Partial Products

Possible estimates are given.

Estimate. Then record the product.

1. Estimate: __1,200__

$$\begin{array}{r} 243 \\ \times\ \ 6 \\ \hline 1,200 \\ 240 \\ +\ \ 18 \\ \hline 1,458 \end{array}$$

2. Estimate: __1,800__

$$\begin{array}{r} 640 \\ \times\ \ 3 \\ \hline 1,920 \end{array}$$

3. Estimate: __$500__

$$\begin{array}{r} \$149 \\ \times\ \ 5 \\ \hline \$745 \end{array}$$

4. Estimate: __5,600__

$$\begin{array}{r} 721 \\ \times\ \ 8 \\ \hline 5,768 \end{array}$$

5. Estimate: __1,200__

$$\begin{array}{r} 293 \\ \times\ \ 4 \\ \hline 1,172 \end{array}$$

6. Estimate: __$2,400__

$$\begin{array}{r} \$416 \\ \times\ \ 6 \\ \hline \$2,496 \end{array}$$

7. Estimate: __2,000__

$$\begin{array}{r} 961 \\ \times\ \ 2 \\ \hline 1,922 \end{array}$$

8. Estimate: __7,200__

$$\begin{array}{r} 837 \\ \times\ \ 9 \\ \hline 7,533 \end{array}$$

Problem Solving · Real World

9. A maze at a county fair is made from 275 bales of hay. The maze at the state fair is made from 4 times as many bales of hay. How many bales of hay are used for the maze at the state fair?

__1,100 bales__

10. Pedro gets 8 hours of sleep each night. How many hours does Pedro sleep in a year with 365 days?

__2,920 hours__

11. Write Math Explain how you can find 4×754 using two different methods.

Check students' work.

_____

PROFESSIONAL LEARNING — MATH TALK IN ACTION

Teacher: What method did you use to solve Problem 6?

Luca: I used place value and partial products.

Mirella: I used expanded form.

Teacher: What do the methods have in common?

Luca: With both methods, I need to understand the value of each place: hundreds, tens, and ones. I multiply the value of each digit of the greater number by the other factor.

Teacher: How are the methods different?

Luca: When using partial products, you multiply the hundreds first, then the tens, then the ones, and then add the partial products.

Mirella: With expanded form, I first find the value of each digit of the greater number. So, the equation is $416 = 400 + 10 + 6$. Then, I rewrite the multiplication using 400, 10, and 6.

Lesson Check

12. A passenger jet flies at an average speed of 548 miles per hour. At that speed, how many miles does the plane travel in 4 hours?

13. Use the model to find 3×157.

_____ **2,192 miles**

_____ **471**

Spiral Review

14. The school fun fair made $1,768 on games and $978 on food sales. How much money did the fun fair make on games and food sales?

15. Use the table below.

State	Population
North Dakota	646,844
Alaska	698,473
Vermont	621,760

List the states from least to greatest population.

_____ **$2,746**

_____ **Vermont, North Dakota, Alaska**

16. A National Park covers 218,375 acres. What is this number written in expanded form?

17. Last year a business had profits of $8,000. This year its profits are 5 times as great. What are this year's profits?

200,000 + 10,000 + 8,000 + 300 + 70 + 5

_____ **$40,000**

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance
Multiply Using Mental Math

SNAPSHOT

Mathematical Standards
- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes
- Model with mathematics.
- Attend to precision.
- Construct arguments and critique reasoning of others.
- Look for and make use of structure.

(I Can) Objective
I can multiply numbers using mental math and properties of operations.

Learning Goal
Use mental math and properties to multiply a multi-digit number by a 1-digit number.

Language Objective
Students collaborate to draw a thought bubble and write inside how to use mental math and properties to help multiply numbers.

MATERIALS
- MathBoard
- index cards
- paper bags

ACROSS THE GRADES

Before	Grade 4	After
Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability.	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.

ABOUT THE MATH

Why Teach This

The focus of this lesson is strategies for mental math. While one student may be able to perform a computation mentally, another student may need to use paper and pencil to perform the same computation.

Students need lots of experience breaking numbers apart to develop number sense. This building of number-sense skills will help students develop mental math strategies that work for them.

Properties are also an important part of developing mental math skills. Knowing how to change the order and grouping of numbers will help students recognize situations where mental math can be used instead of paper and pencil. Mental math is a real-world skill, not just a math class skill.

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.8

Mr. Beck usually drives 182 miles each week. Last week, he drove 3 times as many miles as he usually drives in a week. Estimate the number of miles he drove. **Possible answer: about 600 miles**

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Write the following examples on the board. Have students practice multiplying using patterns.

$1 \times 25 = $ 25	$1 \times 100 = $ 100
$2 \times 25 = $ 50	$2 \times 100 = $ 200
$3 \times 25 = $ 75	$5 \times 100 = $ 500
$4 \times 25 = $ 100	$6 \times 100 = $ 600
$2 \times 100 = $ 200	$5 \times 100 = $ 500
$2 \times 200 = $ 400	$5 \times 200 = $ 1,000
$2 \times 300 = $ 600	$5 \times 300 = $ 1,500
$2 \times 400 = $ 800	$5 \times 400 = $ 2,000

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Discuss students' experiences with the value of a quarter and adding quarters. Use the iTools to show 1 quarter for the students.

- **What is the value of one quarter?** 25 cents

Show 2 quarters.

- **What is the total value of two quarters? Explain.**
  50 cents; Possible answer: skip count by 25s; 25, 50.

❶ Engage

with the **Interactive Student Edition**

I Can Objective

I can multiply numbers using mental math and properties of operations.

Making Connections

Invite students to tell you what they know about the various ways to multiply numbers.

- **Have you ever done a math problem in your head, without pencil, paper, or a calculator? Tell about it.** Possible answer: determining the total cost of two or more items

- **How did you perform multiplication in these situations?** Possible answer: estimated

Learning Activity

A neighborhood wants to install 3 new fire hydrants. Each hydrant costs $152. How much will the neighborhood spend on new fire hydrants?

- **What is the cost of 1 fire hydrant?** $152

- **How many total fire hydrants do they wish to install?** 3 fire hydrants

- **How can you find the total cost of 3 fire hydrants?** Multiply $152 by 3.

- **What is one way to find 3 × $152?** Use place value and partial products. $(3 \times 100) + (3 \times 50) + (3 \times 2)$

② **Explore**

Unlock the Problem 🌎 Real World

MP **Model with mathematics.**

Have students read the problem. Students should understand that they are multiplying the number of sections times the number of groups in each section times the number of seats in each group: sections × groups × seats.

- **Which factors were multiplied first?** 4 and 25
- **How can you use mental math to multiply 4 × 25?** Possible answer: skip count by 25s
- **How does the Commutative Property help you solve this problem?** Possible answer: I can change the order of the factors to multiply factors that I know first. The product stays the same.

MP **Look for and make use of structure.**
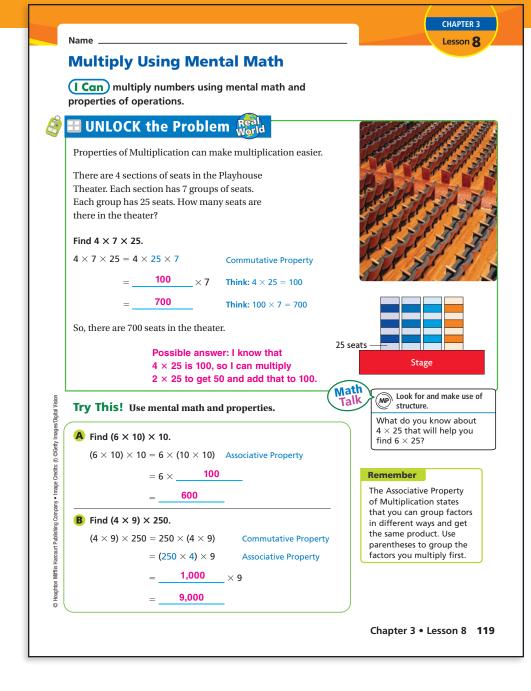
Math Talk Use the **Math Talk** to focus on students' understanding of how to use one product to find another.

Try This!

Example A uses the Associative Property; the parentheses are moved to change the grouping of the factors.

- **Explain how to multiply 10 times 10 mentally.** Possible answer: skip count by 10s

Example B uses the Commutative Property; the factors are written in a different order. It also uses the Associative Property; the parentheses are moved to change the grouping of the factors. Have students suggest ways to multiply 4 × 25 mentally. Discuss how the Associative Property helps to solve the problem.

Multiply Using Mental Math

I Can multiply numbers using mental math and properties of operations.

▦ UNLOCK the Problem 🌎 Real World

Properties of Multiplication can make multiplication easier.

There are 4 sections of seats in the Playhouse Theater. Each section has 7 groups of seats. Each group has 25 seats. How many seats are there in the theater?

Find 4 × 7 × 25.

$4 \times 7 \times 25 = 4 \times 25 \times 7$ — Commutative Property

$= \underline{100} \times 7$ — Think: $4 \times 25 = 100$

$= \underline{700}$ — Think: $100 \times 7 = 700$

So, there are 700 seats in the theater.

Possible answer: I know that
4 × 25 is 100, so I can multiply
2 × 25 to get 50 and add that to 100.

25 seats

Stage

Math Talk
MP Look for and make use of structure.
What do you know about 4 × 25 that will help you find 6 × 25?

Try This! Use mental math and properties.

A Find (6 × 10) × 10.

$(6 \times 10) \times 10 = 6 \times (10 \times 10)$ — Associative Property

$= 6 \times \underline{100}$

$= \underline{600}$

B Find (4 × 9) × 250.

$(4 \times 9) \times 250 = 250 \times (4 \times 9)$ — Commutative Property

$= (250 \times 4) \times 9$ — Associative Property

$= \underline{1,000} \times 9$

$= \underline{9,000}$

Remember
The Associative Property of Multiplication states that you can group factors in different ways and get the same product. Use parentheses to group the factors you multiply first.

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Chapter 3 • Lesson 8   **119**

ML ## Multilingual Support

STRATEGY: Scaffold Language

Write on the board *how many* and *how much*.
- Then write the following sentence frames:

 How many _____s are in this class?

 How much _____ do we spend on math each day?
- Say, **Notice that *how many* is used with plural words—words that usually end in *s*—and *how much* is used with words that are not plural.**
- Using the sentence frames, students take turns asking a partner the two questions and then answering the questions.

More Strategies Choose the strategy that works best with the numbers in the problems.

Example

A Use friendly numbers.

Multiply. 24×250

Think: $24 = 6 \times 4$ and $4 \times 250 = 1,000$

$24 \times 250 = 6 \times 4 \times 250$

$\qquad = 6 \times \underline{\textbf{1,000}}$

$\qquad = \underline{\textbf{6,000}}$

B Use halving and doubling.

Multiply. 16×50

Think: 16 can be divided evenly by 2.

$16 \div 2 = 8$ \qquad Find half of 16.

$8 \times 50 = \underline{\textbf{400}}$ \qquad Multiply.

$2 \times 400 = \underline{\textbf{800}}$ \qquad Double 400.

C Use addition.

Multiply. 4×625

Think: 625 is 600 plus 25.

$4 \times 625 = 4 \times (600 + 25)$

$\qquad = (4 \times 600) + (4 \times 25)$

$\qquad = \underline{\textbf{2,400}} + \underline{\textbf{100}}$

$\qquad = \underline{\textbf{2,500}}$

D Use subtraction.

Multiply. 5×398

Think: 398 is 2 less than 400.

$5 \times 398 = 5 \times (400 - 2)$

$\qquad = (5 \times \underline{\textbf{400}}) - (5 \times 2)$

$\qquad = 2,000 - \underline{\textbf{10}}$

$\qquad = \underline{\textbf{1,990}}$

• What property is being used in Examples C and D? \underline{\textbf{the Distributive Property}}

Share and Show | Math Board

1. Break apart the factor 112 to find 7×112 by using mental math and addition.

$7 \times 112 = 7 \times (\underline{\textbf{100}} + 12)$

$\qquad = \underline{\textbf{(7 × 100) + (7 × 12)}}$

$\qquad = \underline{\textbf{700 + 84}}$

$\qquad = \underline{\textbf{784}}$

120   Go Math! Grade 4

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Ready for More | Visual Partners

Materials index cards, paper bags

• On four separate index cards, have students write four different 1-digit numbers. Have them put these index cards in a paper bag.

• On four other index cards, have students write four different 3-digit numbers. Have them put these index cards in another paper bag.

• Have a student pick one index card from each paper bag. Have one student estimate the product, while the other student finds the product mentally.

• Have students discuss the methods they are using to find the products. Encourage them to make up their own methods to find products using mental math.

Example

Explain that the examples show different mental math strategies for multiplying.

Example A

• **Why might the words "friendly numbers" be used?** The numbers are easy to multiply mentally.

• **How does breaking 24 into 6 × 4 help?** Possible answer: I can use the 4 to multiply 250, which is easy. Then I can finish multiplying with the 6.

Example B

• **With what kind of numbers can you easily use halving?** even numbers

• **When you break 16 into 2 and 8, what is the new multiplication expression for the example?** Possible answers: $8 \times 50 \times 2$; $8 \times 2 \times 50$

Example C

• **How could you break apart 625 into hundreds and tens and ones?** $600 + 20 + 5$

Example D

• **What expression are you using in place of 398?** $400 - 2$

(MP) Look for and make use of structure.

• **When multiplying mentally, what friendly numbers are helpful to look for to multiply by a one-digit number?** Possible answer: numbers that have only one-nonzero digit, 25, and 250
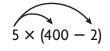
❸ Explain

Share and Show | Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

⚠ Common Errors
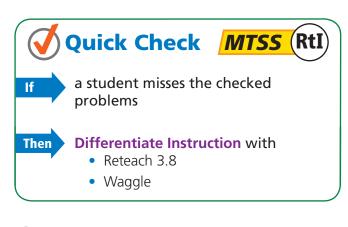
Error When using the Distributive Property with subtraction, students subtract the wrong amount.

Example For $5 \times (400 - 2)$, students write $(5 \times 400) - 2$.

Springboard to Learning After setting up the initial expression, $5 \times (400 - 2)$, have students draw arrows to remind them that each number must be multiplied by 5.

$5 \times (400 - 2)$

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✓ **Quick Check** **MTSS** **RtI**

If ▶ a student misses the checked problems

Then ▶ **Differentiate Instruction** with
- Reteach 3.8
- Waggle

MP **Construct arguments and critique reasoning of others.**

Math Talk ▷ Use **Math Talk** to focus on students' understanding of using properties and operations.

- **What property did you use with both the addition and subtraction strategies?** the Distributive Property
- **For each strategy, did you add or subtract partial products? Why?** Possible answer: In the addition strategy, I added partial products because I wrote one factor as the sum of two numbers. In the subtraction strategy, I subtracted partial products because I wrote one factor as the difference of two numbers.

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④ Elaborate

On Your Own

If students complete the checked problems correctly, they may continue with the remaining problems.

MP **Attend to precision.**
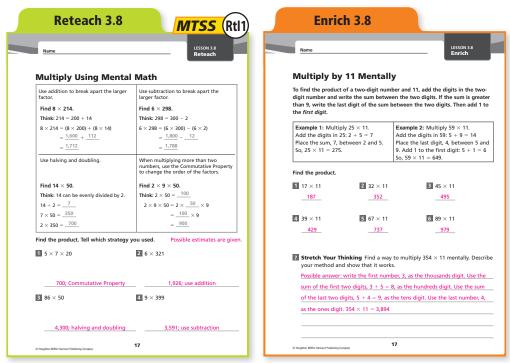
Problems 12 and 13 Students are required to apply the mental math strategies in this lesson in a different way.

In Problem 12, students can use the Distributive Property to think: 40 groups of $21 = 840$, so 42 groups of $21 = 840 + (2$ more groups of 21).

In Problem 13, students generalize that if one factor is halved and the other is doubled, the result is an equivalent expression.

Math Talk: Possible explanation: With both strategies, I break apart a number, use the Distributive Property, and then add or subtract.

Find the product. Tell which strategy you used.
Possible strategies are given.

2. $4 \times 6 \times 50$ **1,200**　　✓**3.** 5×420 **2,100**　　✓**4.** 6×298 **1,788**

Commutative Property　　　use addition　　　use subtraction

Math Talk **MP** Construct arguments and critique reasoning of others.
How is using an addition strategy related to using a subtraction strategy?

On Your Own

Find the product. Tell which strategy you used.
**Possible strategies are given.**

5. 14×50 **700**　　**6.** 32×25 **800**　　**7.** $8 \times 25 \times 23$ **4,600**

halving and doubling　　friendly numbers　　friendly numbers

Use a strategy to find the product.

8. 16×400 **6,400**
9. $3 \times 31 \times 10$ **930**
10. 3×199 **597**
11. $3 \times 1,021$ **3,063**

MP **Use mental math to find the unknown number.**

12. $21 \times 40 = 840$, so $21 \times 42 = $ __882__.

13. $9 \times 60 = 540$, so $18 \times 30 = $ __540__.

14. The science museum sells dinosaur models to schools and libraries for $107 each. The town library buys 3 models. The town elementary school buys 5 models. What is the total cost of the models the town buys?

$856

15. Russell and Farrah each buy 6 books of ride tickets at the fair. Each book has 15 tickets. How many tickets do they buy altogether?

180 tickets

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Chapter 3 • Lesson 8　**121**

Meeting Individual Needs

Reteach 3.8 **MTSS** **RtI1**

Multiply Using Mental Math

Use addition to break apart the larger factor.

Find 8×214.
Think: $214 = 200 + 14$
$8 \times 214 = (8 \times 200) + (8 \times 14)$
　　$= $ _1,600_ $+$ _112_
　　$= $ _1,712_

Use subtraction to break apart the larger factor.

Find 6×298.
Think: $298 = 300 - 2$
$6 \times 298 = (6 \times 300) - (6 \times 2)$
　　$= $ _1,800_ $-$ _12_
　　$= $ _1,788_

Use halving and doubling.

Find 14×50.
Think: 14 can be evenly divided by 2.
$14 \div 2 = $ _7_
$7 \times 50 = $ _350_
$2 \times 350 = $ _700_

When multiplying more than two numbers, use the Commutative Property to change the order of the factors.

Find $2 \times 9 \times 50$.
Think: $2 \times 50 = $ _100_
$2 \times 9 \times 50 = 2 \times$ _50_ $\times 9$
　　$= $ _100_ $\times 9$
　　$= $ _900_

Find the product. Tell which strategy you used.　Possible estimates are given.

1 $5 \times 7 \times 20$
2 6×321

700; Commutative Property　　1,926; use addition

3 86×50
4 9×399

4,300; halving and doubling　　3,591; use subtraction

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Enrich 3.8

Multiply by 11 Mentally

To find the product of a two-digit number and 11, add the digits in the two-digit number and write the sum between the two digits. If the sum is greater than 9, write the last digit of the sum between the two digits. Then add 1 to the *first digit*.

Example 1: Multiply 25×11.
Add the digits in 25: $2 + 5 = 7$
Place the sum, 7, between 2 and 5.
So, $25 \times 11 = 275$.

Example 2: Multiply 59×11.
Add the digits in 59: $5 + 9 = 14$
Place the last digit, 4, between 5 and 9. Add 1 to the first digit: $5 + 1 = 6$
So, $59 \times 11 = 649$.

Find the product.

1 17×11
187

2 32×11
352

3 45×11
495

4 39×11
429

5 67×11
737

6 89×11
979

7 **Stretch Your Thinking** Find a way to multiply 354×11 mentally. Describe your method and show that it works.

Possible answer: write the first number, 3, as the thousands digit. Use the sum of the first two digits, $3 + 5 = 8$, as the hundreds digit. Use the sum of the last two digits, $5 + 4 = 9$, as the tens digit. Use the last number, 4, as the ones digit. $354 \times 11 = 3,894$

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Use the table for 16–18.

16. Three thousand, forty-three people buy tickets at the gate for Section N and one hundred people buy tickets at the gate for Section L. How much money is collected for Section N and Section L at the gate?

   $79,575

17. (MP) Tina and 3 of her friends buy the full season plan for Section M. If there are 45 games in the full season, how much money do they spend?

   $4,500

Arena Ticket Prices Per Game			
Section	Full Season	15-Game Plan	Gate Price
K	$44	$46	$48
L	$30	$32	$35
M	$25	$27	$30
N	$20	$22	$25

18. When the full season tickets first went on sale, 2,000 full season tickets sold for Section N. Two weeks after the tickets first went on sale, another 1,500 full season tickets were sold for Section N. How much money was spent on full season tickets for Section N in total? How much more money was spent when the tickets first went on sale than after the first two weeks?

   $70,000; $10,000 more

MATH on the ▶ Spot

Show the Math
Demonstrate Your Thinking

19. Jose and Daru are given an equation.

   $6 \times 407 = 2,442$

   Jose says the equation is false.
   Daru says the equation is true.
   Who is correct? Explain.

   Daru; Possible explanation: Since 407

   is 7 more than 400, I used addition as

   my strategy. $6 \times (400 + 7) = (6 \times 400) +$

   $(6 \times 7) = 2,400 + 42 = 2,442$

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab -and- Go! ™

Version 2.0
Differentiated Centers Kit

Tabletop Flipchart

Mini-lessons for reteaching to targeted small groups

Readers

Supports key math skills and concepts in real-world situations.

Games

Reinforce math content and vocabulary

Activities

Meaningful and fun math practice

Problem Solving Applications **Real World**

Problem 16 Students are required to find the number for the word form and use it to multiply.

Problem 17 This is a multi-step problem. Students can first find the cost of one game for 4 friends using the information in the table.

Problem 18 Students are required to find the total cost of two groups of tickets for the same section. To answer the questions the problem asks, students need to find the sum of these totals and then the difference.

Math on the Spot Use this video to help students model and solve this type of problem.

Problem 19 Students should recognize the expression 6×407 as illustrating the Distributive Property with addition, which in this case is used as a strategy for multiplication. You may wish to tell students that the expression shows the breaking apart of one of the factors to make computation easier. Encourage students to check their work.

⑤ Evaluate | Formative Assessment

I Can Objective

Have students collaborate to draw a thought bubble and write a response to demonstrate the skill for the I Can statement.

I can multiply numbers using mental math and properties of operations. To do this I can . . .
break apart a number to make numbers that are easy to multiply mentally.

Exit Ticket

Show how to multiply 6×298 using friendly numbers and then using properties and mental math. Write about which method you like better and why.

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Name _____

Multiply Using Mental Math

Find the product. Tell which strategy you used.

Possible strategies are given.

1. 6×297 Think: $297 = 300 - 3$
   $6 \times 297 = 6 \times (300 - 3)$
   $= (6 \times 300) - (6 \times 3)$
   $= 1,800 - 18$
   $= 1,782$

   1,782;
   use subtraction

2. $14 \times 25 \times 4$　　　　　3. 8×604　　　　　4. 50×28

   1,400; Associative　　**4,832; use addition**　　**1,400; halving and doubling**

   Property

Problem Solving · Real World

5. Section J in an arena has 20 rows. Each row has 15 seats. All tickets cost $18 each. If all the seats are sold, how much money will the arena collect for Section J?

   $5,400

6. At a high-school gym, the bleachers are divided into 6 equal sections. Each section can seat 395 people. How many people can be seated in the gym?

   2,370 people

7. **Write Math** Show how to multiply 6×298 using friendly numbers and then using properties and mental math. Write about which method you like better and why.

   Check students' work.

Discuss students' answers to Problem 2.

Teacher:	How can we multiply $14 \times 25 \times 4$?
Jana:	I can multiply 25×4 to get 100, and 100×14 to get 1,400.
Kevin:	I couldn't multiply 14×25 in my head.
Teacher:	So, how would you do this in your head?
Kevin:	I broke apart 14 into $10 + 4$. Then I multiplied $10 \times 25 = 250$ and $4 \times 25 = 100$. I added $250 + 100 = 350$. I multiplied $350 \times 4 = 1,400$.
Liza:	I did that too, but I couldn't multiply 350×4 in my head.
Teacher:	So, how would you do this in your head?

Liza:	I broke apart 350 into $300 + 50$. Then I multiplied $300 \times 4 = 1,200$ and $50 \times 4 = 200$. Then I added $1,200 + 200 = 1,400$.
Teacher:	That's great thinking everyone. Who used another way?
Diego:	I first multiplied $25 \times 4 = 100$. Then I broke apart 14 into 10 and 4. Then I multiplied $100 \times 10 = 1,000$ and $100 \times 4 = 400$. Then I added $1,000 + 400 = 1,400$.
Teacher:	What property did you use?
Diego:	I used the Commutative and Distributive Properties.
Teacher:	That is great thinking too. As we just discussed, there are many different ways to use mental math when we multiply.

Lesson Check

8. Pencils come in cartons of 24 boxes. A school bought 50 cartons of pencils for the start of school. Each box of pencils cost $2. How much did the school spend on pencils?

$2,400

9. The school also bought 195 packages of markers. There are 6 markers in each package. How many markers did the school buy?

1,170 markers

Spiral Review

10. Alex has 175 baseball cards. Raul has 3 times as many baseball cards as Alex. How many fewer cards does Alex have than Raul?

350 cards

11. A theater seats 1,860 people. The last 6 shows have been sold out. Estimate the total number of people attending the last 6 shows.

Possible answer: fewer than 12,000

12. At one basketball game, there were 1,207 people. At the next game, there were 958 people. How many people were at the two games?

2,165 people

13. Tell whether each equation is true or false.

a. $4 \times 3 = 3 + 3 + 3$ _____ **false**

b. $2 \times 6 = 6 + 6$ _____ **true**

c. $8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 = 8 \times 2$ _____ **false**

d. $5 + 5 + 5 + 5 + 5 = 5 \times 5$ _____ **true**

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance

Multi-Step Multiplication Problems

SNAPSHOT

Mathematical Standards

- Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes

- Model with mathematics.
- Attend to precision.
- Reason abstractly and quantitatively.

(I Can) Objective

I can solve real-world problems involving multiplication of whole numbers.

Learning Goal

Use the *draw a diagram* strategy to solve multi-step problems.

Language Objective

Students explain to a partner how to use the *draw a diagram* strategy to solve a multi-step multiplication problem.

MATERIALS

- MathBoard
- two-color counters

ACROSS THE GRADES

Before	Grade 4	After
Solve one- and two-step real-world problems involving any of four operations with whole numbers.	Solve real-world problems involving multiplication and division of whole numbers including problems in which remainders must be interpreted within the context.	Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context.

ABOUT THE MATH

Why Teach This

This lesson involves the problem solving strategy *draw a diagram*.

- A diagram organizes information in a problem and helps students visualize the problem. If a student draws a diagram incorrectly, the answer to the problem may also be incorrect.

- Grid paper is a useful tool for students to use when they are drawing diagrams. It not only helps them keep track of units, but also helps them draw a neater diagram.

- The problems in the lesson are multi-step problems. It is helpful for students to record the steps of the problem in the order they should be performed.

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.9

How many zeros must be in the product of 1,000 and any whole number greater than zero? at least 3

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Vocabulary Builder

Write *multiplication* on the board. Have students think of as many words as they know that relate to this term.

Words that could be included are:

> partial product, product, factor, Distributive Property, round, estimate, Zero Property of Multiplication, Identity Property of Multiplication, Commutative Property of Multiplication, Associative Property of Multiplication, mental math.

- Write the words suggested by the students to the side of the board.
- Ask students to make logical categories as groupings for these words.
- Write the suggested category headings and include a description beneath each.
- Students should then sort the words into the categories they think fit best. They should be able to support their groupings.
- Write the words under their respective category heading.

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Introduce the lesson by asking students:

- **Have you ever wondered how big an orca is?** *The orca is the largest species in the dolphin family. A male orca can be 22 to 27 feet long and weigh 8,000 to 12,000 pounds. A female orca can be 17 to 20 feet long and weigh 3,000 to 8,000 pounds. They have teeth that can be 4 inches long (10 centimeters). Orcas travel in pods (family groups). They communicate with a wide variety of distinctive sounds that the members of the pod can recognize, even at a distance.*

① Engage

with the Interactive Student Edition

I Can Objective

I can solve real-world problems involving multiplication of whole numbers.

Making Connections

Invite students to tell you what they know about using diagrams or pictures to solve problems.

How can drawing a diagram or picture help you solve a one-step multiplication problem such as 8 × 4? You can draw a diagram of 8 groups of 4 or 8 rows of 4 and find the total of the items.

Learning Activity

A company provides blimp rides on two different blimps. The yellow blimp sits 44 passengers and makes 6 trips each day. The blue blimp only sits 32 passengers but makes 8 trips each day. Assuming both blimps take all of their scheduled trips at full capacity, how many more passengers ride the yellow blimp than the blue blimp each day?

- **What are you trying to find?** how many more passengers will be on the yellow blimp each day than on the blue blimp
- **What operation can you use to find the total passengers on each blimp?** multiplication
- **What operation can you use to find the difference in total passengers between the two blimps?** subtraction

② Explore

Unlock the Problem Real World

(MP) **Attend to precision.**

After students read the problem, discuss how they will use the information in the diagram to answer the question. Be sure students understand that they are looking for the number of seats that are *not* in the splash zone.

- **Why do you multiply to find the number of seats in the splash zone?** I know the number of rows and the number of seats in each row. I need to combine equal groups, so I multiply to find the total.

Higher-Order Thinking

While most students will solve this with three steps, some students may enjoy using algebraic notation to write one equation that could be used to represent the problem.

- **How can you write just one equation that could be used to solve the problem?** $(9 \times 18) - (6 \times 8) = n$, where n represents the number of seats not in the splash zone

(MP) **Reason abstractly and quantitatively.**

- **How can you check that your answer is reasonable?** Possible answer: Because I am finding the number of seats not in the splash zone, I know that this number must be less than the total number of seats. I can round the total number of seats and the number of seats in the splash zone and estimate the difference.

Name _____

Multi-Step Multiplication Problems

(I Can) solve real-world problems involving multiplication of whole numbers.

📱 ⊞ UNLOCK the Problem Real World

At the sea park, one section in the stadium has 9 rows with 18 seats in each row. In the center of each of the first 6 rows, 8 seats are in the splash zone. How many seats are not in the splash zone?

Use the graphic organizer to help you solve the problem.

Read the Problem	**Solve the Problem**
What do I need to find? I need to find the number of seats that **are not** in the splash zone.	I drew a diagram of the section to show 9 rows of 18 seats. In the center, I outlined a section to show the 6 rows of 8 seats in the splash zone.
What information do I need to use? There are 9 rows with **18** seats in each row of the section. There are 6 rows with **8** seats in each row of the splash zone.	18 seats / 6 rows / Splash Zone / 9 rows / ← 8 seats →
How will I use the information? I can **multiply** to find both the number of seats in the section and the number of seats in the splash zone.	$\begin{array}{r} 18 \\ \times\ 9 \\ \hline \mathbf{162} \end{array}$ ← total number of seats in the section $\begin{array}{r} 8 \\ \times 6 \\ \hline \mathbf{48} \end{array}$ ← seats in the splash zone

1. What else do you need to do to solve the problem?

Possible answer: Subtract the number of seats in the splash zone from the total number of seats in the section to find the number of seats not in the splash zone. 162 − 48 = 114.

(ML) Multilingual Support

STRATEGY: Frontload
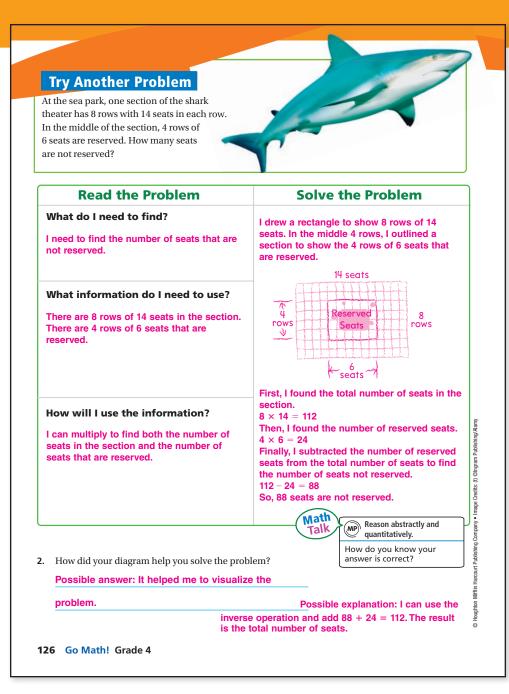
Build the background students need to visualize the context for word problems related to seating, sections, and rows.

- Show the class a diagram or picture of a theater with sections of seats and rows. Point out how it is organized. Explain attendees are seated according to section and row.

- Pair students. Have them think of a place they have seen or been with sections of seats and rows and draw a diagram of that place.

At the sea park, one section of the shark theater has 8 rows with 14 seats in each row. In the middle of the section, 4 rows of 6 seats are reserved. How many seats are not reserved?

Read the Problem	**Solve the Problem**
What do I need to find? I need to find the number of seats that are not reserved.	I drew a rectangle to show 8 rows of 14 seats. In the middle 4 rows, I outlined a section to show the 4 rows of 6 seats that are reserved. 14 seats 4 rows — Reserved Seats — 8 rows 6 seats
What information do I need to use? There are 8 rows of 14 seats in the section. There are 4 rows of 6 seats that are reserved.	First, I found the total number of seats in the section. $8 \times 14 = 112$ Then, I found the number of reserved seats. $4 \times 6 = 24$ Finally, I subtracted the number of reserved seats from the total number of seats to find the number of seats not reserved. $112 - 24 = 88$ So, 88 seats are not reserved.
How will I use the information? I can multiply to find both the number of seats in the section and the number of seats that are reserved.	

Math Talk

(MP) Reason abstractly and quantitatively.

How do you know your answer is correct?

2. How did your diagram help you solve the problem?

Possible answer: It helped me to visualize the problem.

Possible explanation: I can use the inverse operation and add $88 + 24 = 112$. The result is the total number of seats.

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Ready for More

Kinesthetic / Visual Partners

Materials two-color counters

- Group students into pairs. One student arranges the counters in an array. The other student writes a story problem that matches the array.

- Next, the first student modifies the array by turning over some of the counters. The second student continues the story, including the change of these counters, to make a multi-step problem.

- Have pairs exchange their story problems with another pair. Each pair should make a diagram to represent the problem and then solve it. Pairs then compare diagrams.

Try Another Problem
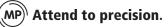
Have students answer the questions in the graphic organizer and then draw a diagram. Students should be able to describe how they solved the problem.

- **Why is the strategy *draw a diagram* a good way to solve this problem?** A diagram helps you visualize how the reserved seats relate to the seats that are not reserved in the section.

(MP) **Reason abstractly and quantitatively.**

Math Talk — Use **Math Talk** to help students recognize that they can check their answer by adding it to the number of reserved seats. The sum should be equal to the total number of seats.

- **After you found the number of reserved seats, what operation did you use to find the number of seats that are not reserved?** subtraction

- **What operation is the inverse of subtraction?** addition

- **What numbers will you add to check your answer?** Possible answer: I will add my answer, the number of seats that are not reserved, and the number of reserved seats.

(MP) **Attend to precision.**

- **Suppose there were two sections of reserved seats. How would your calculations be different?** Possible answer: I would have to count or multiply to find the number of seats in each reserved section, and then subtract each from the total number of seats. The final difference would be the number of seats that were not reserved.

! Common Errors

Error Students may not read the problem correctly.

Example Students write the number of reserved seats instead of the seats that are not reserved.

24 seats

Springboard to Learning Have students circle the question in the problem and then rewrite it in their own words.

③ Explain

Share and Show ▣ Math Board
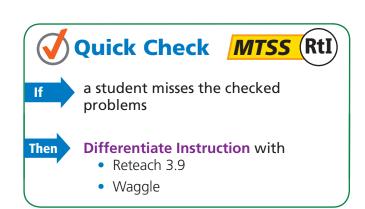
The first problem is connected to the learning model. Have students use the MathBoard to explain their thinking. As you walk around the room, check students' diagrams to be sure that they have outlined 8 rows of 14 for Section A and 6 rows of 16 for Section B.
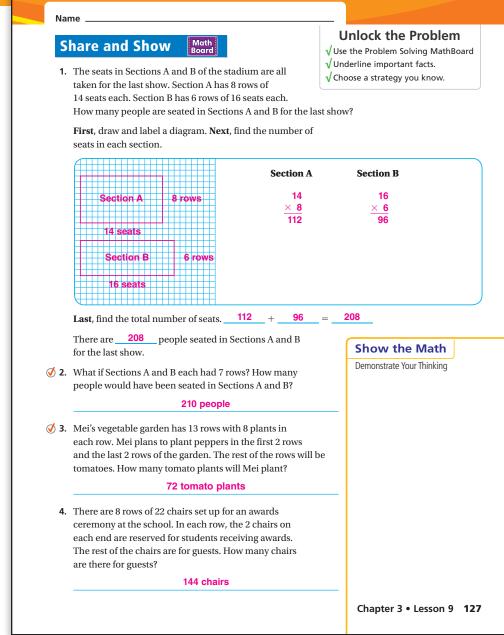
After students complete Problem 2, you may wish to ask this question.

Ⓜ️ⓅAttend to precision.
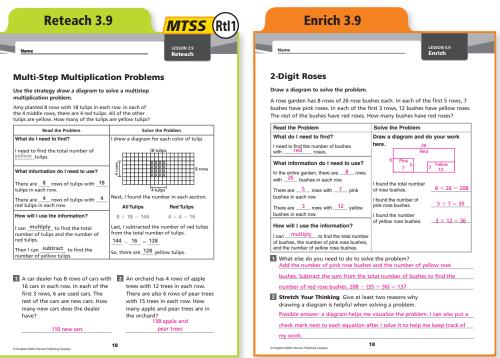
- **Why didn't you get the same number of people for Problems 1 and 2?** In Problem 2, Section A has 14 fewer people but Section B has 16 more people. 16 − 14 = 2; there would be 2 more people seated.

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✓ Quick Check MTSS RtI

If	a student misses the checked problems
Then	**Differentiate Instruction** with • Reteach 3.9 • Waggle

---

Share and Show Math Board

Unlock the Problem
√ Use the Problem Solving MathBoard
√ Underline important facts.
√ Choose a strategy you know.

1. The seats in Sections A and B of the stadium are all taken for the last show. Section A has 8 rows of 14 seats each. Section B has 6 rows of 16 seats each. How many people are seated in Sections A and B for the last show?

First, draw and label a diagram. **Next**, find the number of seats in each section.

	Section A	Section B
	14	16
	× 8	× 6
	112	96

Section A — 8 rows
14 seats
Section B — 6 rows
16 seats

Last, find the total number of seats. __112__ + __96__ = __208__

There are __208__ people seated in Sections A and B for the last show.

2. What if Sections A and B each had 7 rows? How many people would have been seated in Sections A and B?

210 people

3. Mei's vegetable garden has 13 rows with 8 plants in each row. Mei plans to plant peppers in the first 2 rows and the last 2 rows of the garden. The rest of the rows will be tomatoes. How many tomato plants will Mei plant?

72 tomato plants

4. There are 8 rows of 22 chairs set up for an awards ceremony at the school. In each row, the 2 chairs on each end are reserved for students receiving awards. The rest of the chairs are for guests. How many chairs are there for guests?

144 chairs

Show the Math
Demonstrate Your Thinking

Chapter 3 • Lesson 9   127

Meeting Individual Needs

Reteach 3.9   MTSS RtI1

LESSON 3.9 Reteach

Multi-Step Multiplication Problems

Use the strategy *draw a diagram* to solve a multistep multiplication problem.

Amy planted 8 rows with 18 tulips in each row. In each of the 4 middle rows, there are 4 red tulips. All of the other tulips are yellow. How many of the tulips are yellow tulips?

Read the Problem	Solve the Problem
What do I need to find? I need to find the total number of yellow tulips.	I drew a diagram for each color of tulip. Next, I found the number in each section. All Tulips: 8 × 18 = 144 Red Tulips: 4 × 4 = 16
What information do I need to use? There are 8 rows of tulips with 18 tulips in each row. There are 4 rows of tulips with 4 red tulips in each row.	Last, I subtracted the number of red tulips from the total number of tulips. 144 − 16 = 128
How will I use the information? I can multiply to find the total number of tulips and the number of red tulips. Then I can subtract to find the number of yellow tulips.	So, there are 128 yellow tulips.

1 A car dealer has 8 rows of cars with 16 cars in each row. In each of the first 3 rows, 6 are used cars. The rest of the cars are new cars. How many new cars does the dealer have?
110 new cars

2 An orchard has 4 rows of apple trees with 12 trees in each row. There are also 6 rows of pear trees with 15 trees in each row. How many apple and pear trees are in the orchard?
138 apple and pear trees

18

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Enrich 3.9

LESSON 3.9 Enrich

2-Digit Roses

Draw a diagram to solve the problem.

A rose garden has 8 rows of 26 rose bushes each. In each of the first 5 rows, 7 bushes have pink roses. In each of the first 3 rows, 12 bushes have yellow roses. The rest of the bushes have red roses. How many bushes have red roses?

Read the Problem	Solve the Problem
What do I need to find? I need to find the number of bushes with red roses.	**Draw a diagram and do your work here.**
What information do I need to use? In the entire garden, there are 8 rows with 26 bushes in each row. There are 5 rows with 7 pink bushes in each row. There are 3 rows with 12 yellow bushes in each row.	I found the total number of rose bushes. 8 × 26 = 208 I found the number of pink rose bushes. 5 × 7 = 35 I found the number of yellow rose bushes. 3 × 12 = 36
How will I use the information? I can multiply to find the total number of bushes, the number of pink rose bushes, and the number of yellow rose bushes.	

1 What else do you need to do to solve the problem?
Add the number of pink rose bushes and the number of yellow rose bushes. Subtract the sum from the total number of bushes to find the number of red rose bushes. 208 − (35 + 36) = 137

2 **Stretch Your Thinking** Give at least two reasons why drawing a diagram is helpful when solving a problem.
Possible answer: a diagram helps me visualize the problem. I can also put a check mark next to each equation after I solve it to help me keep track of my work.

18

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Use the graph for problems 5–6.

5. Mr. Torres took his students to the dolphin show. Each row in the stadium had 11 seats. One adult sat at each end of a row, and each group of 4 students was seated between 2 adults. Mr. Torres sat by himself. How many adults were there?

10 adults including Mr. Torres

6. **Write Math** Another stadium section has 24 rows of 10 seats each. Describe at least two ways Mrs. Ahmed's class can sit if an equal number of students sits in each row.

Possible answers: 4 rows of 9 students; 6 rows of 6 students; 9 rows of 4 students; 12 rows of 3 students; 18 rows of 2 students

7. Afreen, Tori, and Liz each bought a toy fish. Afreen's fish is 10 inches longer than Tori's fish. Liz's fish is 2 inches longer than twice the length of Tori's fish. Tori's fish is 12 inches long. Find the length of each toy fish.

Afreen's: 22 in.; Liz's: 26 in.

8. (MP) Nell made a secret code. Each code word has 2 letters. Each word begins with a consonant and ends with a vowel. How many code words can Nell make with 3 consonants and 2 vowels?

6 code words

9. Allie is building a patio. The patio will have 8 tiles in each of 13 rows. She has already built the center section with 4 tiles in each of 7 rows. How many more tiles are needed to complete the patio? Show your work.

76 more tiles are needed to complete the patio.

$8 \times 13 = 104$, $7 \times 4 = 28$, $104 - 28 = 76$

Sea Park Field Trips

Teacher

Ms. Bird
Mr. Torres
Mrs. Ahmed's

0 6 12 18 24 30 36 42
Number of Students

Show the Math
Demonstrate Your Thinking

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™

Version 2.0
Differentiated Centers Kit

Tabletop Flipchart

Mini-lessons for reteaching to targeted small groups

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Supports key math skills and concepts in real-world situations.

Games

Reinforce math content and vocabulary

Activities

Meaningful and fun math practice

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④ **Elaborate**

On Your Own

If students complete the checked problems correctly, they may continue.

(MP) **Model with mathematics.**

Problem 5 Students may find it helpful to make a diagram of how the students and adults are seated in each row, as well as Mr. Torres seated by himself.

Problem 7 Students need to recognize that they are given the length of Tori's fish. From this, they can use the information they are given about the remaining fish to draw diagrams of how they compare to Tori's fish.

Problem 8 Students are required to make a list in order to solve this multi-step problem.

Problem 9 Students should recognize this is a multi-step problem. Those who have difficulty determining how to approach the problem, may find it helpful to draw a diagram. Students who multiply incorrectly may be forgetting to add regrouped tens.

⑤ **Evaluate** | Formative Assessment

I Can

Have students Choose a problem from the lesson, choose a method to solve it, and explain to a partner to demonstrate the skill for the I Can statement.

I can solve real-world problems involving multiplication of whole numbers by . . . drawing diagrams to help me organize the information in the problems. Drawing a diagram helps me visualize how the information in the problem is related.

Exit Ticket

Write a word problem that can be solved using multiplication of two-digit numbers. Solve your word problem and explain the solution.

Multi–Step Multiplication Problems

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items. Use the Write Math section to determine students' understanding of content for this lesson.

Name _____

Multi-Step Multiplication Problems

Solve each problem.

1. A community park has 6 tables with a chessboard painted on top. Each board has 8 rows of 8 squares. When a game is set up, 4 rows of 8 squares on each board are covered with chess pieces. If a game is set up on each table, how many total squares are NOT covered by chess pieces?

   $4 \times 8 = 32$
   $6 \times 32 = \blacksquare$

   _____ **192 squares**

---

2. Jonah and his friends go apple picking. Jonah fills 5 baskets. Each basket holds 15 apples. If 4 of Jonah's friends pick the same amount as Jonah, how many apples do Jonah and his friends pick in all? Draw a diagram to solve the problem.

   $5 \times 15 = 75$ $5 \times 75 = 375$

   _____ **375 apples**

3. **Write Math** Write a word problem that can be solved using multiplication of two-digit numbers. Solve your word problem and explain the solution.

   Check students' work.

   _____

   _____

   _____

   _____

Chapter 3 • Lesson 9   **129**

Lesson Check

4. At a tree farm, there are 9 rows of 36 spruce trees. In each row, 14 of the spruce trees are blue spruce. How many spruce trees are NOT blue spruce?

_____**198 spruce trees**_____

5. Kai is tiling a countertop. He needs to place 54 square tiles in each of 8 rows to cover the counter. He wants to randomly place 8 groups of 4 blue tiles each and have the rest of the tiles be white. How many white tiles will Kai need?

_____**400 white tiles**_____

Spiral Review

6. Juan reads a book with 368 pages. Savannah reads a book with 172 fewer pages than Juan's book. How many pages are in the book Savannah reads?

_____**196 pages**_____

7. Hailey has bottles that hold 678 pennies each. About how many pennies does she have if she has 6 bottles filled with pennies?

_____**Possible estimate: about 4,200 pennies**_____

8. Terrence plants a garden that has 8 rows of flowers, with 28 flowers in each row. How many flowers did Terrence plant?

_____**224 flowers**_____

9. Ivan has 5 fish in his fish tank. Jasmine has 4 times as many fish as Ivan has. How many fish does Jasmine have?

_____**20 fish**_____

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance

Multiply 3-Digit and 4-Digit Numbers with Regrouping

SNAPSHOT

Mathematical Standards

- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Mathematical Practices and Processes

- Model with mathematics.
- Attend to precision.
- Construct arguments and critique reasoning of others.
- Reason abstractly and quantitatively.

I Can Objective

I can multiply whole numbers using estimation, rounding, and place value.

Learning Goal

Use regrouping to multiply a multi-digit number by a 1-digit number.

Language Objective

Student pairs demonstrate to a small group how you can use regrouping to multiply.

MATERIALS

- MathBoard
- 1-centimeter grid paper

ACROSS THE GRADES

Before	Grade 4	After
Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability.	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.

ABOUT THE MATH

Teaching for Depth

For most computations, students start with an estimate to establish what a reasonable answer should be. With an estimated answer, the estimate is the answer. Students seldom check an estimated answer.

- Students should utilize other methods for determining if their estimated answer is reasonable. For example, if students have rounded to determine the answer, they might determine a range of estimates to check their estimates.

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.10

Write an expression that shows how to multiply 6×435 using place value and expanded form. **Possible answer:** $(6 \times 400) + (6 \times 30) + (6 \times 5)$

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Write the following problems on the board. Have students complete the problems and check their answers with a partner.

$327 + 4{,}618 =$ **4,945**

$26{,}806 + 7{,}495 =$ **34,301**

$583 + 6{,}279 =$ **6,862**

Remind students who rewrite addition problems in vertical form to align the numbers by place value. Point out that regrouping may or may not be needed in every place of a problem.

FOCUSING ON THE WHOLE STUDENT

Supporting All Learners

In this lesson, students will learn how to multiply whole numbers using estimation, rounding, and place value. Saudi Arabia produces many gallons of oil per day. The amount of oil can be used in a mathematical problem involving multiplication of whole numbers. Suppose on a particular day Saudi Arabia produces about 11 million barrels of oil. You can find how many gallons are produced by multiplying the number of barrels by the number of gallons per barrel. Ask students to share any knowledge they have on oil.

Access Prior Knowledge

Write these numbers on the board.

1,545 1,623 1,872

Have a volunteer come to the board and round one of the numbers to the nearest thousand and to the nearest hundred, and write the numbers.

- **Explain how you rounded the numbers.** Answers will vary, but should include place value and rounding strategies.

Continue in the same way with the other numbers.

① Engage

with the Interactive Student Edition

I Can Objective

I can multiply whole numbers using estimation, rounding, and place value.

Making Connections

Invite students to tell you what they know about different methods for multiplication.

- **What does it mean to use repeated addition to multiply 356 by 4?** Add 4 groups of 356.

- **What does it mean to use expanded form to multiply 356 by 4?** Write the multi-digit number in expanded form and then perform multiplication. $(4 \times 300) + (4 \times 50) + (4 \times 6)$

Learning Activity

A diner orders 217 loaves of bread each week. In the month of February, there will be exactly 4 weeks of deliveries. How many loaves of bread will the diner order in February? Ask the following questions.

- **How many loaves of bread does the diner order each week?** 217 loaves

- **How many weeks of deliveries will there be?** 4 weeks

- **What multiplication problem will let you determine the number of loaves ordered in February?** 4×217

② Explore

Unlock the Problem 🌎 Real World

• **Why do you estimate before you multiply?**
I estimate so I will know what is a reasonable answer.

(MP) Reason abstractly and quantitatively.

• **Explain how you know if the estimate will be less than or greater than the actual product.** Since one factor is rounded to a number greater than the actual number and the other stayed the same, the estimate will be greater than the exact product.

To extend their thinking, ask students about a strategy for finding a range for the exact answer by estimation.

• **How can you find an estimate that is a range for the exact answer by estimating?** I can round the greater factor up and down to work with a number that I can multiply mentally.

• **What is the new estimate?** between 1,500 and 1,800

(MP) Attend to precision.

• **How does the method for multiplying a 3-digit number by a 1-digit number compare to multiplying a 2-digit number by a 1-digit number?** Possible answer: In both cases, each digit in the multi-digit number is multiplied by the 1-digit number starting with the ones digit and moving left, regrouping as needed. To multiply a 3-digit number, there is also a hundreds digit to multiply.

Name _____

Multiply 3-Digit and 4-Digit Numbers with Regrouping

(I Can) multiply whole numbers using estimation, rounding, and place value.

🔓 UNLOCK the Problem 🌎 Real World

Alley Spring, in Missouri, produces an average of 567 million gallons of water per week. How many million gallons of water do the springs produce in 3 weeks?

Multiply. 3×567 **Possible estimate:**

Estimate. $3 \times$ __600__ $=$ __1,800__

THINK		RECORD
STEP 1 Multiply the ones. 3×7 ones = __21__ ones Regroup the 21 ones.		$\begin{array}{r}\overset{2}{567} \\ \times\ 3 \\ \hline 1\end{array}$ Regroup the 21 ones as 2 tens 1 one.
STEP 2 Multiply the tens. 3×6 tens = __18__ tens Add the regrouped tens. 18 tens + 2 tens = 20 tens Regroup the 20 tens.		$\begin{array}{r}\overset{2}{\overset{2}{567}} \\ \times\ 3 \\ \hline 01\end{array}$ Regroup 20 tens as 2 hundreds 0 tens.
STEP 3 Multiply the hundreds. 3×5 hundreds = __15__ hundreds Add the regrouped hundreds. 15 hundreds + 2 hundreds = 17 hundreds		$\begin{array}{r}\overset{2}{\overset{2}{567}} \\ \times\ 3 \\ \hline 1,701\end{array}$ 17 hundreds is the same as 1 thousand 7 hundreds.

So, Alley Spring produces __1,701__ million gallons of water in 3 weeks.

(ML) Multilingual Support

STRATEGY: Frontload

Help students by anticipating and reducing difficulties students might have knowing how to respond to questions beginning with *how much* and *how many*.

• Write on the board:
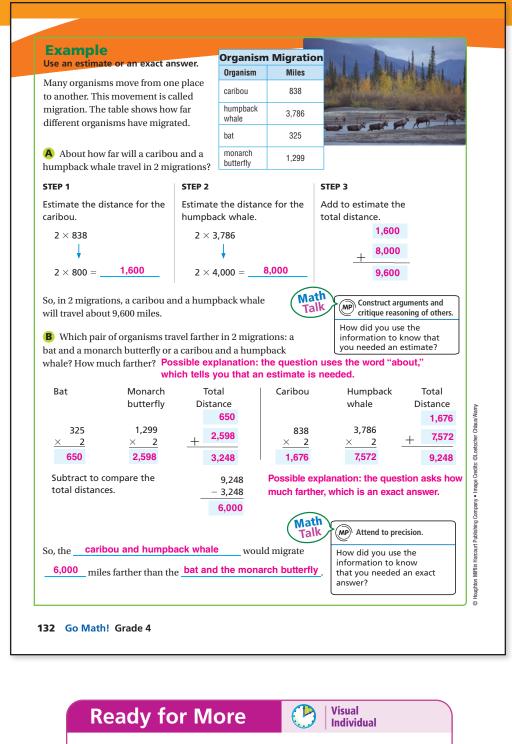
   How many boys are in our class?

   How many girls are there?

   How much time do you take to eat your lunch?

   How much time do you spend doing math problems each day?

• Pair students. Have students ask each other these questions, pointing out which are exact and which are estimates.

Example

Use an estimate or an exact answer.

Many organisms move from one place to another. This movement is called migration. The table shows how far different organisms have migrated.

Organism Migration	
Organism	**Miles**
caribou	838
humpback whale	3,786
bat	325
monarch butterfly	1,299

A About how far will a caribou and a humpback whale travel in 2 migrations?

STEP 1

Estimate the distance for the caribou.

2 × 838

↓

2 × 800 = **1,600**

STEP 2

Estimate the distance for the humpback whale.

2 × 3,786

↓

2 × 4,000 = **8,000**

STEP 3

Add to estimate the total distance.

```
    1,600
+   8,000
    9,600
```

So, in 2 migrations, a caribou and a humpback whale will travel about 9,600 miles.

B Which pair of organisms travel farther in 2 migrations: a bat and a monarch butterfly or a caribou and a humpback whale? How much farther? **Possible explanation: the question uses the word "about," which tells you that an estimate is needed.**

Bat	Monarch butterfly		Total Distance
			650
325	1,299	+	**2,598**
× 2	× 2		**3,248**
650	**2,598**		

Caribou	Humpback whale		Total Distance
			1,676
838	3,786	+	**7,572**
× 2	× 2		**9,248**
1,676	**7,572**		

Subtract to compare the total distances.

```
  9,248
- 3,248
  6,000
```

Possible explanation: the question asks how much farther, which is an exact answer.

Math Talk — (MP) Construct arguments and critique reasoning of others.
How did you use the information to know that you needed an estimate?

So, the **caribou and humpback whale** would migrate **6,000** miles farther than the **bat and the monarch butterfly**.

Math Talk — (MP) Attend to precision.
How did you use the information to know that you needed an exact answer?

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Example

Example A

- **Why couldn't you just multiply 4 × 800 to estimate the total number of miles traveled?** Possible answer: The miles traveled by each animal is very different.

- **Why don't you need to regroup when you multiply 2 × 800?** Possible answer: 16 hundreds is the same as 1 thousand 6 hundreds. So, I can just write the 16 in the answer.

(MP) **Construct arguments and critique reasoning of others.**

Math Talk Use **Math Talk** to check students' understanding of estimates.

Example B

- **Why is the 9,600 miles estimate for the number of miles traveled by the caribou and humpback whale in 2 migrations greater than the 9,248 miles actually traveled by the caribou and humpback whale in 2 migrations?** I rounded 838 down to the nearest hundred but I rounded 3,786 up to the nearest thousand.

(MP) **Attend to precision.**

Math Talk Use **Math Talk** to check students' understanding of precision

---

Ready for More
Visual / Individual

Materials 1-centimeter grid paper

- Challenge students to fill in missing digits to complete multiplication equations.

- Give students the problems below. Have them use grid paper and the given digits to complete each problem.

1. 2, 3, and 5

3 × 3, 5 2 7 = 10,581

2. 2, 4, and 6

5 × 6, 4 7 2 = 32,360

⚠ Common Errors

Error Students may write the regrouped number in the wrong location.

Example

```
    1
  1,299
  ×   2
      8
```

Springboard to Learning Emphasize that a regrouped number is written over the place immediately to the left of the place that is being multiplied. Have students draw lines to help them keep the places aligned.

```
    1
1,299
×   2
    8
```

Chapter 3 • Lesson 10   132

❸ Explain

Share and Show 🔲Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking. Have students describe what is happening in Step 3.

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✓ **Quick Check** **MTSS** **RtI**

If → a student misses the checked problems

Then → **Differentiate Instruction** with
- Reteach 3.10
- Waggle

(MP) **Attend to precision.**

(Math Talk) Use **Math Talk** to check students' understanding of the usefulness of estimating a product.

- **How would it be helpful to know the number of digits a product will have?** Possible answer: This could help you see that you may have made a regrouping error. If you made a regrouping error, you may have more digits in the product than there should be.
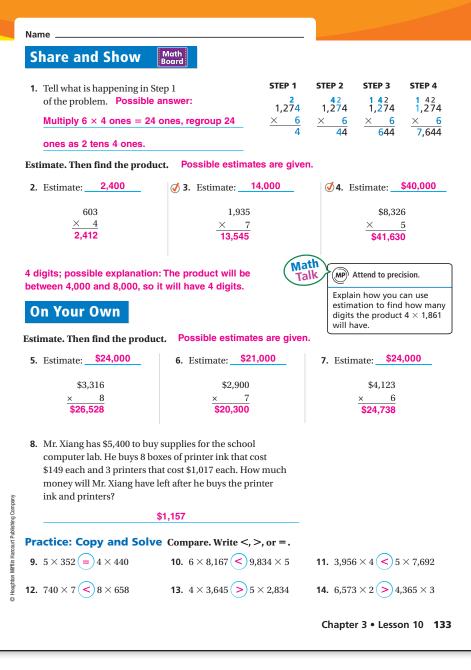
❹ Elaborate

On Your Own

If students complete the checked problems correctly, they may continue with the remaining problems.

(MP) **Model with mathematics.**

Encourage students to develop different strategies for multiplying.

- **In Problem 9, how could multiplying 2 × 440 help you find the product of 4 × 440?** Possible answer: 2 × 440 = 880; 880 + 880 = 1,760

Name _____

Share and Show 🔲Math Board

1. Tell what is happening in Step 1 of the problem. **Possible answer:**
   Multiply 6 × 4 ones = 24 ones, regroup 24 ones as 2 tens 4 ones.

	STEP 1	STEP 2	STEP 3	STEP 4
	2	42	1 42	1 42
	1,274	1,274	1,274	1,274
	× 6	× 6	× 6	× 6
	4	44	644	7,644

Estimate. Then find the product. **Possible estimates are given.**

2. Estimate: __2,400__
$$\begin{array}{r} 603 \\ \times\ 4 \\ \hline 2,412 \end{array}$$

✓ 3. Estimate: __14,000__
$$\begin{array}{r} 1,935 \\ \times\ 7 \\ \hline 13,545 \end{array}$$

✓ 4. Estimate: __$40,000__
$$\begin{array}{r} \$8,326 \\ \times\ 5 \\ \hline \$41,630 \end{array}$$

4 digits; possible explanation: The product will be between 4,000 and 8,000, so it will have 4 digits.

(Math Talk) (MP) **Attend to precision.**
Explain how you can use estimation to find how many digits the product 4 × 1,861 will have.

On Your Own

Estimate. Then find the product. **Possible estimates are given.**

5. Estimate: __$24,000__
$$\begin{array}{r} \$3,316 \\ \times\ 8 \\ \hline \$26,528 \end{array}$$

6. Estimate: __$21,000__
$$\begin{array}{r} \$2,900 \\ \times\ 7 \\ \hline \$20,300 \end{array}$$

7. Estimate: __$24,000__
$$\begin{array}{r} \$4,123 \\ \times\ 6 \\ \hline \$24,738 \end{array}$$

8. Mr. Xiang has $5,400 to buy supplies for the school computer lab. He buys 8 boxes of printer ink that cost $149 each and 3 printers that cost $1,017 each. How much money will Mr. Xiang have left after he buys the printer ink and printers?

   __$1,157__

Practice: Copy and Solve Compare. Write <, >, or = .

9. 5 × 352 ⊜ 4 × 440   10. 6 × 8,167 ⊙< 9,834 × 5   11. 3,956 × 4 ⊙< 5 × 7,692

12. 740 × 7 ⊙< 8 × 658   13. 4 × 3,645 ⊙> 5 × 2,834   14. 6,573 × 2 ⊙> 4,365 × 3

Chapter 3 • Lesson 10   **133**

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Meeting Individual Needs

Reteach 3.10 **MTSS** **RtI1**

Name _____   LESSON 3.10 Reteach

Multiply 3-Digit and 4-Digit Numbers with Regrouping

When you multiply 3-digit and 4-digit numbers, you may need to regroup.

Estimate. Then find the product. $1,324 × 7

Step 1 Estimate the product. $1,324 rounds to $1,000; $1,000 × 7 = $7,000.

Step 2 Multiply the 4 ones by 7. Regroup the 28 ones as 2 tens 8 ones.
$$\begin{array}{r} 2 \\ \$1,324 \\ \times\ 7 \\ \hline 8 \end{array}$$

Step 3 Multiply the 2 tens by 7. Add the regrouped tens. Regroup the 16 tens as 1 hundred 6 tens.
$$\begin{array}{r} 1\ 2 \\ \$1,324 \\ \times\ 7 \\ \hline 68 \end{array}$$

Step 4 Multiply the 3 hundreds by 7. Add the regrouped hundred. Regroup the 22 hundreds as 2 thousands 2 hundreds.
$$\begin{array}{r} 2\ 1\ 2 \\ \$1,324 \\ \times\ 7 \\ \hline 268 \end{array}$$

Step 5 Multiply the 1 thousand by 7. Add the regrouped thousands.
$$\begin{array}{r} 2\ 1\ 2 \\ \$1,324 \\ \times\ 7 \\ \hline 9,268 \end{array}$$

So, 7 × $1,324 = $9,268.
Since $9,268 is close to the estimate of $7,000, the answer is reasonable.

Estimate. Then find the product. Possible estimates are given.

1. Estimate: __6,000__
$$\begin{array}{r} 3,184 \\ \times\ 2 \\ \hline 6,368 \end{array}$$

2. Estimate: __$3,200__
$$\begin{array}{r} \$828 \\ \times\ 4 \\ \hline \$3,312 \end{array}$$

3. Estimate: __15,000__
$$\begin{array}{r} 2,637 \\ \times\ 5 \\ \hline 13,185 \end{array}$$

4. Estimate: __$49,000__
$$\begin{array}{r} \$6,900 \\ \times\ 7 \\ \hline \$48,300 \end{array}$$

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Enrich 3.10

Name _____   LESSON 3.10 Enrich

Multiplication Mystery

There's something mysterious in the water off the coast of Florida. To discover what it is, find the products and use the decoder below. The first letter has been done for you.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

1. Letter 1: 2 × 6,532
   Answer: __13,064__
   Code: Use the ten thousands digit and the thousands digit.
   __13__ Letter: __M__

2. Letter 2: 5 × 245
   Answer: __1,225__
   Code: Use the thousands digit.
   __1__ Letter: __A__

3. Letter 3: 3 × 4,893
   Answer: __14,679__
   Code: Use the ten thousands digit and the thousands digit.
   __14__ Letter: __N__

4. Letter 4: 7 × 198
   Answer: __1,386__
   Code: Use the thousands digit.
   __1__ Letter: __A__

5. Letter 5: 6 × 3,411
   Answer: __20,466__
   Code: Use the ten thousands digit and the thousands digit.
   __20__ Letter: __T__

6. Letter 6: 4 × 129
   Answer: __516__
   Code: Use the hundreds digit.
   __5__ Letter: __E__

7. Letter 7: 8 × 730
   Answer: __5,840__
   Code: Use the thousands digit.
   __5__ Letter: __E__

IT'S A M __A N A T E E__ !

8. The product of 5 and another number has the code for E in its ones place. What digit could be in the ones place of the other number? **Explain.**
   Since the code for E is 5, the product of 5 and the digit in the ones place must end in 5. So, the digit is 1, 3, 5, 7, or 9.

9. (Write Math) Is the product of a 4-digit number and a 1-digit number always a 5-digit number? **Explain.**
   Possible answer: No. For example, in 4,000 × 1 = 4,000, the product is not a 5-digit number.

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15. Airplane tickets to Fairbanks, Alaska, will cost $958 each. Airplane tickets to Vancouver, Canada, will cost $734. How much can the four members of the Harrison family save on airfare by vacationing in Vancouver?

$896

Show the Math
Demonstrate Your Thinking

16. Philadelphia, Pennsylvania, is 2,147 miles from Salt Lake City, Utah, and 2,868 miles from Portland, Oregon. What is the difference in the round-trip distances between Philadelphia and each of the other two cities? Explain whether you need an estimate or an exact answer.

1,442 mi; possible explanation: exact answer since the question asks for a difference

MATH on the ▶ Spot

17. (MP) Vahe says that the product of a 4-digit number and a 1-digit number is always a 4-digit number. Does Vahe's statement make sense? Explain.

No. Possible explanation: When there are regrouped thousands, the product of a 4-digit number and a 1-digit number can have 5 digits.

18. What number is 150 more than the product of 5 and 4,892? Explain how you found the answer.

24,610; Possible explanation: First find the product 5 × 4,892 = 24,460. Then add 150 to the product; 24,460 + 150 = 24,610.

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DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™
Version 2.0
Differentiated Centers Kit

Tabletop Flipchart
Mini-lessons for reteaching to targeted small groups

Readers
Supports key math skills and concepts in real-world situations.

Games
Reinforce math content and vocabulary

Activities
Meaningful and fun math practice

Problem Solving Applications · Real World

Have students discuss how to decide when to estimate an answer or find an exact answer.

Problem 16 Students should recognize that the one-way distances between cities are given, but they need to compare the round-trip distances. Therefore, this is a multi-step problem involving multiplication and subtraction.

Math on the Spot Use this video to help students model and solve this type of problem.

Higher-Order Thinking

(MP) **Reason abstractly and quantitatively.**

Problem 17 Students are required to use higher order thinking skills to decide if Vahe's conclusion is correct.

Problem 18 Students should recognize that this is a multi-step problem involving multiplication then addition. If students set up the problem correctly but still have the wrong answer, check for computational and regrouping errors.

⑤ Evaluate | Formative Assessment

I Can Objective

Have student pairs demonstrate to a small group the skill for the I Can statement.

I can multiply whole numbers using estimation, rounding, and place value . . .
To estimate when multiplying I can round the number(s) to the greatest place based on the values in each number. For example, suppose I was estimating the value of 4 × 698. First, I would round 698 to 700 because 698 is closer to 700 than it is to 600. Then, I would multiply 700 by 4 to get an estimate of the answer.

Exit Ticket
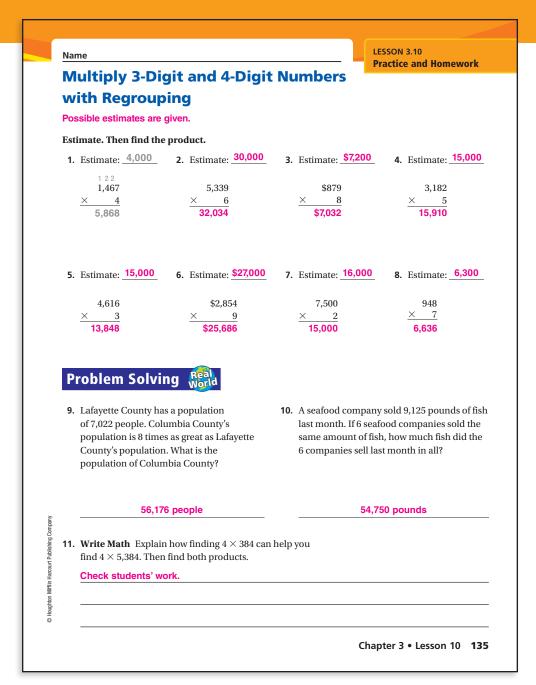
Explain how finding 4 × 384 can help you find 4 × 5,384. Then find both products.

Practice and Homework

Multiply 3-Digit and 4-Digit Numbers with Regrouping

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving. Use the Write Math section to determine students' understanding of content for this lesson.

Multiply 3-Digit and 4-Digit Numbers with Regrouping

Possible estimates are given.

Estimate. Then find the product.

1. Estimate: **4,000**

```
   1 2 2
   1,467
×      4
   5,868
```

2. Estimate: **30,000**

```
   5,339
×      6
  32,034
```

3. Estimate: **$7,200**

```
   $879
×      8
  $7,032
```

4. Estimate: **15,000**

```
   3,182
×      5
  15,910
```

5. Estimate: **15,000**

```
   4,616
×      3
  13,848
```

6. Estimate: **$27,000**

```
   $2,854
×       9
  $25,686
```

7. Estimate: **16,000**

```
   7,500
×      2
  15,000
```

8. Estimate: **6,300**

```
    948
×     7
  6,636
```

Problem Solving Real World

9. Lafayette County has a population of 7,022 people. Columbia County's population is 8 times as great as Lafayette County's population. What is the population of Columbia County?

_____**56,176 people**_____

10. A seafood company sold 9,125 pounds of fish last month. If 6 seafood companies sold the same amount of fish, how much fish did the 6 companies sell last month in all?

_____**54,750 pounds**_____

11. Write Math Explain how finding 4 × 384 can help you find 4 × 5,384. Then find both products.

Check students' work.

_____

_____

Lesson Check

12. By recycling 1 ton of paper, 6,953 gallons of water are saved. How many gallons of water are saved by recycling 4 tons of paper?

_____ **27,812 gallons** _____

13. Esteban counted the number of steps it took him to walk to school. He counted 1,138 steps. How many steps does he take walking to and from school each day?

_____ **2,276 steps** _____

Spiral Review

14. A website has 13,406 people registered. What is the word form of this number?

_____ **thirteen thousand, four hundred six** _____

15. In one year, the Kumar family drove their car 15,680 miles. To the nearest thousand, how many miles did they drive their car that year?

_____ **16,000 miles** _____

16. In a store there are 3 aisles of 20 bins of fruits and vegetables. In each aisle, 12 of the bins are vegetables. How many bins of fruit are there in all?

_____ **24 bins** _____

17. Lea buys 6 model cars that each cost $15. She also buys 4 bottles of paint that each cost $11. How much does Lea spend on model cars and paint?

_____ **$134** _____

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Lesson at a Glance

Solve Multi-Step Problems Using Equations

SNAPSHOT

Mathematical Standards

- Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Mathematical Practices and Processes

- Model with mathematics.
- Attend to precision.

I Can Objective

I can solve real-world multi-step problems using multiplication, addition, and subtraction.

Learning Goal

Solve real-world multi-step problems using multiplication, addition, and subtraction.

Language Objective

Student pairs describe to another group how to solve real-world multi-step problems using multiplication, addition, and subtraction.

MATERIALS

- MathBoard
- index cards

ACROSS THE GRADES

Before	Grade 4	After
Solve one- and two-step real-world problems involving any of four operations with whole numbers.	Solve real-world problems involving multiplication and division of whole numbers including problems in which remainders must be interpreted within the context.	Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context.

ABOUT THE MATH

Why Teach This

In this lesson, students must solve multi-step word problems. When a word problem has a lot of context it is sometimes hard for students to understand what needs to be done in order to solve it.

As students read the problem, have them make a list of any useful information. Once they have a list of this information, have them draw a diagram. A diagram will help students visualize the problem which will help them solve it.

For more professional learning, go online to Teacher's Corner.

🖥 Problem of the Day 3.11

Estimate 1,920 × 3 and then find the product. Possible estimate: 6,000; Product: 5,760

🖥 Vocabulary

- Interactive Student Edition
- Multilingual Glossary

Fluency Builder

Have students complete the calculations.

1. 170 + 153 **323**
2. 150 × 6 **900**
3. 256 × 4 **1,024**
4. 556 − 421 **135**
5. 555 + 682 **1,237**
6. 125 − 42 **83**

FOCUSING ON THE WHOLE STUDENT

Access Prior Knowledge

Choose one or more of the following activities.

- Have one partner act out the role of installing each type of traffic sign. Have the other student explain a possible method to solve the problem.
- Have students write a short story in which more than one math operation is used.

Have students discuss how the math operations played a role in the short story.

① Engage

with the Interactive Student Edition

I Can Objective

I can solve real-world multi-step problems using multiplication, addition, and subtraction.

Making Connections

- **What are the different math operations?** addition, subtraction, multiplication, and division
- **In what situations in real life do you use math operations?** Possible answer: Use addition to find the number of items you have. Use multiplication to find the number of students in four classes with the same number of students in each class.

Learning Activity

A town is replacing all of its traffic signs. The crew responsible for the work is replacing the signs in two batches, first replacing all of the stop signs then all of the other street signs. The crew spent 8 days replacing the stop signs, installing 23 signs each day. They then spent 10 days replacing other street signs, installing 56 signs each day. If there were 925 signs that had to be replaced, how many more signs will the crew install?

- **What problem are you trying to solve?** how many more signs the crew has left to install
- **How many stop signs were installed each day?** 23 stop signs **For how many days?** 8 days
- **How many street signs were installed each day?** 56 street signs **For how many days?** 10 days
- **How many signs will be installed in all?** 925 signs
- Have students identify math operations they might use to solve this problem.

② Explore

Unlock the Problem 🌎 Real World

Read and discuss the problem. Make sure students understand that the solution to the problem can be found by breaking the question into steps.

In order to find each step, have students underline important information in the problem.

Discuss with students the series of single-step equations they can model and solve in order to answer this multi-step problem.

- **The models for Steps 1 and 2 both represent multiplication equations. Why does the model for Step 1 show 3 equal sections while the model for Step 2 shows 2 equal sections?** Because in Step 1 there are 3 hard drives, and in Step 2 there are 2 hard drives. The equal sections represent the number of hard drives.

- **How does the model represent the equation given in Step 3?** Each addend is represented by a box shown in the bar model. There are two addends; therefore, there are two boxes in the bar model. The sum or total, *a*, is represented by the bracket.

- **Notice that the bar model in Step 4 represents subtraction. How could you draw a model to represent 306 − 39 = *x*?** I could replace 224 in the model with 306, 78 with 39, and *y* with *x*.

Solve Multi-Step Problems Using Equations

I Can solve real-world multi-step problems using multiplication, addition, and subtraction.

⊞ UNLOCK the Problem 🌎 Real World

Chris's computer has 3 hard drives with 64 gigabytes of space each, and 2 hard drives with 16 gigabytes of space each. The files on his computer use 78 gigabytes of space. How much hard drive space does his computer have left?

Use multiple single-step equations.

STEP 1 Find how much hard drive space is on 3 hard drives with 64 gigabytes of space each.

64	64	64

← 3 hard drives with 64 gigabytes.

n ← Total space on 3 hard drives with 64 gigabytes.

$3 \times 64 = n$

$\underline{192} = n$

STEP 2 Find how much hard drive space is on 2 hard drives with 16 gigabytes of space.

16	16

← 2 hard drives with 16 gigabytes.

p ← Total space on 2 hard drives with 16 gigabytes.

$2 \times 16 = p$

$\underline{32} = p$

STEP 3 Find the total hard drive space on the computer.

Total space on 64-gigabyte hard drives.   Total space on 16-gigabyte hard drives.

192	32

a ← Total hard drive space on computer.

$192 + 32 = a$

$\underline{224} = a$

STEP 4 The files use 78 gigabytes of space. Find how much hard drive space the computer has left.

space left   space used

y	78

224 ← Total space on the computer.

$224 − 78 = y$

$\underline{146} = y$

So, Chris has __146__ gigabytes of hard drive space left on his computer.

Chapter 3 • Lesson 11   **137**

ᴹᴸ Multilingual Support

STRATEGY: Identify Relationships

- Explain that in story problems, students may read that a given number of items hold or contain some number of smaller items. For example, show students 3 notebooks that contain 100 pages each.

- Remind students that they can represent a situation like this using multiplication. To find the total number of pages in the notebooks, write $3 \times 100 = 300$ pages.

- Ask students to represent the following situations and find the total number of items:

  - the number of pens in 2 packs of 3 pens each
  - the number of balls in 4 bags of 15 balls each

1. Carnie and Doug bake cookies to sell at a bake sale. Carnie makes 3 batches of 17 cookies each and Doug makes 3 batches of 20 cookies each. After ten minutes at the bake sale, they sold 32 cookies. How many cookies do Carnie and Doug have left to sell?

17	17	17

p

$3 \times 17 = p$; $51 = p$ ← First, multiply 3×17. Let p represent the number of cookies Carnie makes.

20	20	20

a

$3 \times 20 = a$; $60 = a$ ← Next, multiply 3×20. Let a represent the number of cookies Doug makes.

51	60

y

$51 + 60 = y$; $111 = y$ ← Then, add the two products. Let y represent the number of cookies Carnie and Doug make.

$111 - 32 = n$; $79 = n$ ← Finally, subtract to find the number of cookies Carnie and Doug have left to sell.

2. Dyani buys 3 bags of lollipops, with 12 lollipops in each bag. She also buys 4 bags of gum, with 11 pieces in each bag. How many lollipops and pieces of gum does Dyani have?

80 lollipops and pieces of gum

3. Simba has 4 boxes with 32 marbles in each box. He has 7 boxes with 18 shells in each box. If he gets 20 marbles from a friend, how many marbles and shells does he have?

274 marbles and shells

On Your Own

4. Mario drove 60 miles each day to and from work for 5 days. Then he drove 54 miles each day on Saturday and Sunday. How many miles did Mario drive during those seven days?

408 miles

5. Keqing has 3 binders with 25 stamps in each binder. She has 5 binders with 24 baseball cards in each binder. If she gives 35 stamps to a friend, how many stamps and cards does she have left?

160 stamps and cards

Possible explanation: I added to find the total number of cookies both Doug and Carnie baked. Multiplying would have meant that there were 51 groups of 60 cookies, instead of a total of 111 cookies.

Math Talk (MP) Attend to precision.

Explain why in Problem 1 you added during step 3 instead of multiplying.

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❸ Explain

Share and Show 🟪 Math Board

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

Use the checked problems for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

✅ **Quick Check** **MTSS** **RtI**

If ➤ a student misses the checked problems

Then ➤ **Differentiate Instruction** with
  • Reteach 3.11
  • Waggle

(MP) **Attend to precision.**

Math Talk Use **Math Talk** to check students' understanding of operations to use during different steps of a problem.

❹ Elaborate

On Your Own

If students complete the checked problems correctly, they may continue with the remaining problems.

Ready for More 🕐 | Logical / Mathematical Partners

Materials: index cards

• Have students work in pairs. Give each pair of students 8 index cards.

• Have students write whole numbers ranging from 10 to 40 on 4 of the cards and dollar amounts ranging from $2 to $9 on the other 4. The whole-number cards represent the number of hours a student worked, and the dollar-amount cards represent the hourly wage.

• Have each student draw 2 of each type of card. Students can match pairs of cards to "earn" the most money. Students determine how much money they earned by solving a multi-step equation.

• Have students repeat the activity twice, and encourage them to try to "earn" the greatest amount of money possible.
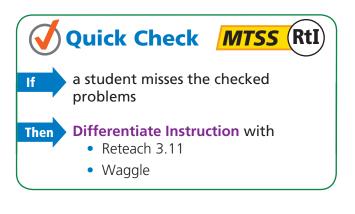
Higher-Order Thinking

After students read Problem 6 and review Dominic's work, students should identify that Dominic wrote the equations incorrectly. He wrote addition equations instead of multiplication equations. He did draw the **bar models** correctly.

Math on the Spot Use this video to help students model and solve this type of problem.

! **Common Errors**

Error Students may not use the correct operation when writing an equation.

Example Dominic added $5 + 12$ instead of multiplying 5×12.

Springboard to Learning Remind students to determine what information they are needing to solve for when writing equations. If they are trying to find the number of items in a certain number of equal groups, multiplication should be used, not addition.

Name _____

6. Dominic has 5 books with 12 postcards in each book. He has 4 boxes with 20 coins in each box. If he gives 15 postcards to a friend, how many postcards and coins does he have?

MATH on the ▶ Spot

Dominic drew this model.

| 12 | 12 | 12 | 12 | 12 | 20 | 20 | 20 | 20 | ← total postcards and coins

| 15 |

postcards given away n postcards and coins left

Dominic used these steps to solve.

$5 + 12 = p$

$4 + 20 = c$

$17 + 24 = y$

$41 - 15 = n$

$26 = n$

Look at the steps Dominic used to solve this problem. Find and describe his error.

Dominic added instead of multiplied to find the number of postcards and the number of coins.

Use the correct steps to solve the problem.

$5 \times 12 = p$

$4 \times 20 = c$

$60 + 80 = y$

$140 - 15 = n$

$125 = n$

So, there are __125__ postcards and coins left.

Meeting Individual Needs

Reteach 3.11   **MTSS** (RtI1)

LESSON 3.11 Reteach

Name _____

Solve Multi-Step Problems Using Equations

You can use single-step equations to model and solve a problem with more than one step.

Aliyah buys 4 packages of pens with 18 pens in each package. Kailyn buys 6 packages of pens with 14 pens in each package. How many more pens does Kailyn buy than Aliyah?

A. Write multiplication equations to find how many pens each girl buys. Let a = number of pens Aliyah buys. Let k = number of pens Kailyn buys.

Aliyah   Kailyn
$4 \times 18 = a$ $6 \times 14 = k$
$72 = a$ $72 = a$

B. Write an equation to find how many more pens Kailyn buys. Let p = how many more pens.

$84 - 72 = p$
$12 = p$

Kailyn buys __12__ more pens than Aliyah.

Find the answer. Show your work. Possible work is shown.

1 Gabe sells 23 car wash tickets. Each ticket costs $7. His dad gives him a $15 donation. How much money does Gabe collect? Let c = amount collected. Let g = ticket sales.

Gabe collects __$176__.

$23 \times 7 = g$ $161 \times 15 = c$
$161 = g$ $176 = c$

2 Nicole has 48 stickers. She gives 5 stickers to each of her 6 friends. How many stickers does Nicole have left? Let s = stickers left. Let g = stickers given away.

Nicole has __18 stickers left__.

$5 \times 6 = g$ $48 - 30 = s$
$30 = g$ $18 = s$

20

Enrich 3.11

LESSON 3.11 Enrich

Name _____

It's a Riddle!

Solve each problem. Look for the answer in the riddle below and write the letter of the problem on the line. Not all letters will be used.

C Maria takes 24 photos at the circus and 72 photos on her vacation. If each page in her scrapbook can hold 6 photos, how many pages can Maria fill? 16	**I** Carmen and Wayne sell 25 birdhouses at a craft fair. They share the money equally. If each birdhouse costs $14, how much money will Carmen and Wayne each receive? $175
R José uses 3 flowers for each corsage he makes. He has orders for 18 corsages each from two different stores. How many flowers will he need? 108	**L** Mr. Davis sells sleeping bags. He has 30 red sleeping bags and 26 green sleeping bags to put on shelves. Each shelf can hold 8 sleeping bags. How many shelves can he fill? 7
Y Taren makes 62 chocolate chip cookies and 74 oatmeal cookies. If she places 8 cookies on a plate for the bake sale, how many plates will Taren need? 17	**T** Keisha bought 10 bags of apples. There are 15 apples in each bag. If Keisha repacks the apples into 5 bags, how many apples will be in each bag? 30
N Chan and his two sisters make and sell jewelry. They sell each piece of jewelry for $9 and agree to share the money equally. If they sell 38 pieces of jewelry in all, how much money will each person receive? $114	**E** Linh orders 16 blueberry muffins and 24 cranberry muffins from a bakery. The bakery places 8 muffins in each package. How many packages will Linh have to pick up? 5

Which city has no people?

E	L	E	C	T	R	I	C	I	T	Y
5	7	5	16	30	108	175	16	175	30	17

20

Fill in the bubble completely to show your answer.

7. Eric is getting his mountain climbing certificate. There are 63 days that Eric climbs for 2 hours, there are 97 days that he climbs for 1 hour, and there are 22 days that he climbs for 3 hours. How many more hours does Eric need to climb until he earns a certificate for climbing 500 hours?

   ● 211 hours   Ⓒ 318 hours

   Ⓑ 289 hours   Ⓓ 321 hours

8. Hanh has 315 photos that she wants to put into albums. She buys 4 albums that hold 24 photos each. There are 3 albums that hold 72 photos each. Hanh plans to put any leftover photos into frames. How many frames will Hanh need to buy?

   Ⓐ 0   Ⓒ 5

   ● 3   Ⓓ 13

9. The soccer team sells 54 bagels with cream cheese for $2 each and 36 muffins for $1 each during a bake sale. The coach uses the bake sale money to buy socks for the 14 players at $6 a pair. How much money does the coach have left to buy soccer balls?

   Ⓐ $0   ● $60

   Ⓑ $27   Ⓓ $138

10. Trina has 2 bags with 14 pinecones in each bag. She has 7 boxes with 15 acorns in each box. If she trades 5 pinecones for 10 acorns, how many pinecones and acorns does she have?

    Ⓐ 28

    Ⓑ 105

    Ⓒ 133

    ● 138

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Problem Solving Applications **Real World**

(MP) **Model with mathematics.**

Problems 7–9 Students are required to break down the word problems. Using the information in the problems, students must represent them using equations. Once equations are formed the student must solve them in order to solve the problem.

⑤ Evaluate | Formative Assessment

I Can

Have student pairs describe to another group the process to demonstrate the skill for the I Can statement.

I can solve real-world multi-step problems using multiplication, addition, and subtraction by . . . making models from the information given. Then I can use the models to write and solve the equations needed to solve the problem.

Exit Ticket

Write a word problem that requires you to use multiple steps to solve it.

DIFFERENTIATED INSTRUCTION • Independent Activities

Grab-and-Go!™

Version 2.0

Differentiated Centers Kit

Tabletop Flipchart

Mini-lessons for reteaching to targeted small groups

Readers

Supports key math skills and concepts in real-world situations.

Games

Reinforce math content and vocabulary

Activities

Meaningful and fun math practice
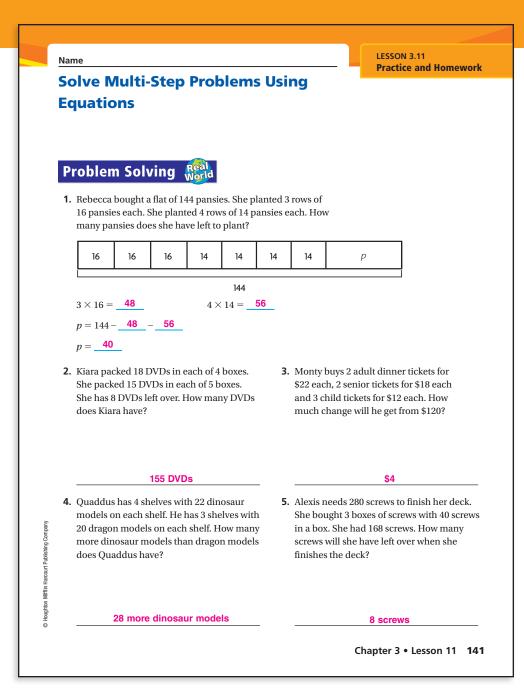
Practice and Homework

Solve Multi–Step Problems Using Equations

Use the Practice and Homework pages to provide students with more practice of the concepts and skills presented in this lesson. Students master their understanding as they complete practice items and then challenge their critical thinking skills with Problem Solving.

Solve Multi-Step Problems Using Equations

Problem Solving · Real World

1. Rebecca bought a flat of 144 pansies. She planted 3 rows of 16 pansies each. She planted 4 rows of 14 pansies each. How many pansies does she have left to plant?

16	16	16	14	14	14	14	p

144

$3 \times 16 =$ __48__ $4 \times 14 =$ __56__

$p = 144 -$ __48__ $-$ __56__

$p =$ __40__

2. Kiara packed 18 DVDs in each of 4 boxes. She packed 15 DVDs in each of 5 boxes. She has 8 DVDs left over. How many DVDs does Kiara have?

____**155 DVDs**____

3. Monty buys 2 adult dinner tickets for $22 each, 2 senior tickets for $18 each and 3 child tickets for $12 each. How much change will he get from $120?

____**$4**____

4. Quaddus has 4 shelves with 22 dinosaur models on each shelf. He has 3 shelves with 20 dragon models on each shelf. How many more dinosaur models than dragon models does Quaddus have?

____**28 more dinosaur models**____

5. Alexis needs 280 screws to finish her deck. She bought 3 boxes of screws with 40 screws in a box. She had 168 screws. How many screws will she have left over when she finishes the deck?

____**8 screws**____

Chapter 3 • Lesson 11 **141**

Lesson Check

Fill in the bubble completely to show your answer.

6. Erika baked 7 trays of 12 muffins each. Simon baked 5 trays of 18 muffins each. They agreed to make 200 muffins for the school bake sale. How many more muffins do they need to make?

- ● 26
- (B) 36
- (C) 38
- (D) 52

7. Victoria is buying stickers. She bought 3 packages of stars with 24 in each package. She bought 2 packages of rainbows with 16 in each package. She bought 4 packages of hearts with 10 in each package. She used 82 of the stickers to make cards. How many stickers does Victoria have left?

- ● 62
- (B) 72
- (C) 96
- (D) 114

8. Ghandi bagged his potatoes in 18 ten-pound bags, 16 five-pound bags, and 4 twenty-five pound bags. He has 2 pounds of potatoes left over. How many pounds of potatoes does Ghandi have?

- (A) 262 pounds
- (B) 352 pounds
- (C) 358 pounds
- ● 362 pounds

9. Mateo bought 6 hats for $14 each and 3 belts for $33 each. How much change did he get from $200?

- (A) $7
- ● $17
- (C) $27
- (D) $58

Spiral Review

10. Jarita bought 352 ounces of juice. She used 320 ounces of juice to make punch. How many ounces of juice does Jarita have left?

- (A) 22 ounces
- ● 32 ounces
- (C) 42 ounces
- (D) 52 ounces

11. Jules counted 30 big balloons. There were 6 times as many small balloons as big balloons. How many small balloons were there?

- (A) 18
- (B) 108
- ● 180
- (D) 1,800

Continue to practice concepts and skills with Lesson Check. Use Spiral Review to engage students in previously taught concepts and to promote content retention.

Chapter Review

Summative Assessment

Use the **Chapter Review** to assess students' progress in Chapter 3.

Name _____

Chapter Review

For Problems 1–3, use the table.

Prices for Trees					
Tree	Regular Price	Price for 3 or more	Tree	Regular Price	Price for 3 or more
Ivory silk lilac	$25	$22	Hazelnut	$9	$8
White pine	$40	$37	Red maple	$9	$8
Bur oak	$35	$32	Birch	$9	$8

1. What is the cost of 3 bur oak trees and 2 ivory silk lilac trees? Show your work.

   $146   32   25   96 + 50 = 146
           × 3   × 2
           96   50

2. Mr. Tan buys 4 white pine trees and 5 birch trees. What is the cost of the trees? Show your work and explain how you found the answer.

   $188; $37   5 × $8 = $40 $148 + $40 = $188
            × 4
            $148

   Possible explanation: First, I found the total cost of the white pine trees and the total cost of the birch trees. Then, I added the total cost of the white pine trees ($148) and the total cost of the birch trees ($40) together.

3. Rudy will buy 3 ivory silk lilac trees or 2 bur oak trees. He wants to buy the trees that cost less. What trees will he buy? How much will he save? Show your work.

   Rudy will buy 3 ivory silk lilac trees; $4
   22 × 3 = 66; 35 × 2 = 70
   $70 − $66 = $4
   Check students' work.

4. For Problems 4a–4d, select True or False for each equation.

   4a. $7 \times 9 = 7 + 7 + 7 + 7 + 7 + 7 + 7$ ○ True   ● False

   4b. $2 + 2 + 2 + 2 + 2 + 2 + 2 = 7 \times 2$ ● True   ○ False

   4c. $6 \times 3 = 3 + 3 + 3 + 3 + 3$ ○ True   ● False

   4d. $4 + 4 + 4 + 4 + 4 = 5 \times 4$ ● True   ○ False

5. **Part A**

   Draw a line to match each section in the model to the partial product it represents.

   3×6 3×100 3×40

   Part B

   Find 3×146. Show your work and explain.

   146   Check students' work.
   × 3
   300
   120
   + 18
   438

   Possible explanation: The model shows that I can write 146 as 100 + 40 + 6. Then I multiply each number by 3 to get the partial products 300, 120, and 18. The sum of the partial products, 438, is the answer.
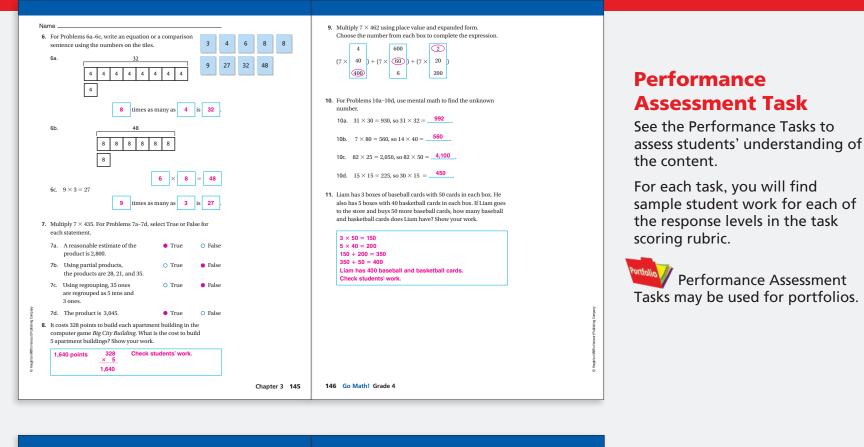
Online, Data-Driven Decision Making

MTSS RtI   **HMH | Waggle®**
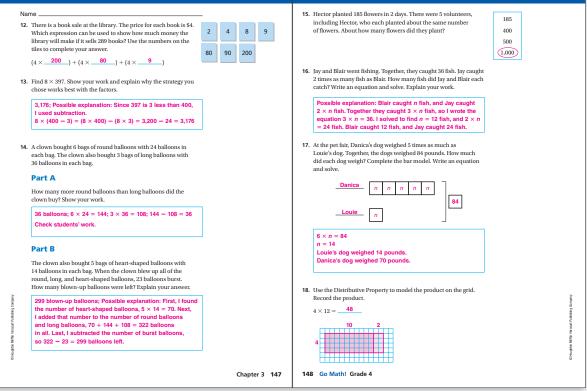
Based on the results of the Chapter Review, use the following resources to review skills.

Item	Lesson	Content Focus	Intervene With
1, 2, 3	3.9	Use the *draw a diagram* strategy to solve multi-step problems.	**Reteach 3.9**, Waggle
4, 17	3.2	Solve problems involving multiplicative comparison and additive comparison.	**Reteach 3.2**, Waggle
6	3.1	Relate multiplication equations and comparison statements.	**Reteach 3.1**, Waggle
5A, 9, 12	3.6	Use expanded form to multiply a multi-digit number by a 1-digit number.	**Reteach 3.6**, Waggle
5B, 13	3.7	Use place value and partial products to multiply a multi-digit number by a 1-digit number.	**Reteach 3.7**, Waggle
11	3.3	Multiply tens, hundreds, and thousands by whole numbers through 10.	**Reteach 3.3**, Waggle
10, 13	3.8	Use mental math and properties to multiply a multi-digit number by a 1-digit number.	**Reteach 3.8**, Waggle
7, 8	3.10	Use regrouping to multiply a multi-digit number by a 1-digit number.	**Reteach 3.10**, Waggle
15	3.4	Estimate products by rounding and determine if exact answers to multiplication problems are reasonable.	**Reteach 3.4**, Waggle
14, 16	3.11	Solve real-world multi-step problems using multiplication, addition, and subtraction.	**Reteach 3.11**, Waggle
18	3.5	Use the Distributive Property to multiply a 2-digit number by a 1-digit number.	**Reteach 3.5**, Waggle

6. For Problems 6a–6c, write an equation or a comparison sentence using the numbers on the tiles.

Tiles: 3 4 6 8 8 / 9 27 32 48

6a.

32

4 4 4 4 4 4 4

4

8 times as many as **4** is **32**.

6b.

48

8 8 8 8 8 8

8

6 × **8** = **48**

6c. 9 × 3 = 27

9 times as many as **3** is **27**.

7. Multiply 7 × 435. For Problems 7a–7d, select True or False for each statement.

7a. A reasonable estimate of the product is 2,800. ● True ○ False

7b. Using partial products, the products are 28, 21, and 35. ○ True ● False

7c. Using regrouping, 35 ones are regrouped as 5 tens and 3 ones. ○ True ● False

7d. The product is 3,045. ● True ○ False

8. It costs 328 points to build each apartment building in the computer game *Big City Building*. What is the cost to build 5 apartment buildings? Show your work.

1,640 points   328   **Check students' work.**
                  × 5
                1,640

9. Multiply 7 × 462 using place value and expanded form. Choose the number from each box to complete the expression.

(7 × [4 / **40** / **400**]) + (7 × [**600** / **60** / 6]) + (7 × [**2** / 20 / 200])

10. For Problems 10a–10d, use mental math to find the unknown number.

10a. 31 × 30 = 930, so 31 × 32 = **992**

10b. 7 × 80 = 560, so 14 × 40 = **560**

10c. 82 × 25 = 2,050, so 82 × 50 = **4,100**

10d. 15 × 15 = 225, so 30 × 15 = **450**

11. Liam has 3 boxes of baseball cards with 50 cards in each box. He also has 5 boxes with 40 basketball cards in each box. If Liam goes to the store and buys 50 more baseball cards, how many baseball and basketball cards does Liam have? Show your work.

3 × 50 = 150
5 × 40 = 200
150 + 200 = 350
350 + 50 = 400
Liam has 400 baseball and basketball cards.
Check students' work.

Performance Assessment Task

See the Performance Tasks to assess students' understanding of the content.

For each task, you will find sample student work for each of the response levels in the task scoring rubric.

Portfolio Performance Assessment Tasks may be used for portfolios.

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12. There is a book sale at the library. The price for each book is $4. Which expression can be used to show how much money the library will make if it sells 289 books? Use the numbers on the tiles to complete your answer.

Tiles: 2 4 8 9 / 80 90 200

(4 × **200**) + (4 × **80**) + (4 × **9**)

13. Find 8 × 397. Show your work and explain why the strategy you chose works best with the factors.

3,176; Possible explanation: Since 397 is 3 less than 400, I used subtraction.
8 × (400 − 3) = (8 × 400) − (8 × 3) = 3,200 − 24 = 3,176

14. A clown bought 6 bags of round balloons with 24 balloons in each bag. The clown also bought 3 bags of long balloons with 36 balloons in each bag.

Part A

How many more round balloons than long balloons did the clown buy? Show your work.

36 balloons; 6 × 24 = 144; 3 × 36 = 108; 144 − 108 = 36
Check students' work.

Part B

The clown also bought 5 bags of heart-shaped balloons with 14 balloons in each bag. When the clown blew up all of the round, long, and heart-shaped balloons, 23 balloons burst. How many blown-up balloons were left? Explain your answer.

299 blown-up balloons; Possible explanation: First, I found the number of heart-shaped balloons, 5 × 14 = 70. Next, I added that number to the number of round balloons and long balloons, 70 + 144 + 108 = 322 balloons in all. Last, I subtracted the number of burst balloons, so 322 − 23 = 299 balloons left.

15. Hector planted 185 flowers in 2 days. There were 5 volunteers, including Hector, who each planted about the same number of flowers. About how many flowers did they plant?

Tiles: 185 / 400 / 500 / **1,000**

16. Jay and Blair went fishing. Together, they caught 36 fish. Jay caught 2 times as many fish as Blair. How many fish did Jay and Blair each catch? Write an equation and solve. Explain your work.

Possible explanation: Blair caught n fish, and Jay caught 2 × n fish. Together they caught 3 × n fish, so I wrote the equation 3 × n = 36. I solved to find n = 12 fish, and 2 × n = 24 fish. Blair caught 12 fish, and Jay caught 24 fish.

17. At the pet fair, Danica's dog weighed 5 times as much as Louie's dog. Together, the dogs weighed 84 pounds. How much did each dog weigh? Complete the bar model. Write an equation and solve.

Danica: n n n n n
Louie: n
84

6 × n = 84
n = 14
Louie's dog weighed 14 pounds.
Danica's dog weighed 70 pounds.

18. Use the Distributive Property to model the product on the grid. Record the product.

4 × 12 = **48**

10   2
4

Chapter Test

Summative Assessment

Use the **Chapter Test** to assess students' progress in Chapter 3.

Chapter Tests are found in the *Assessment Guide*. Test items are presented in formats consistent with high-stakes assessments.

data checkpoint

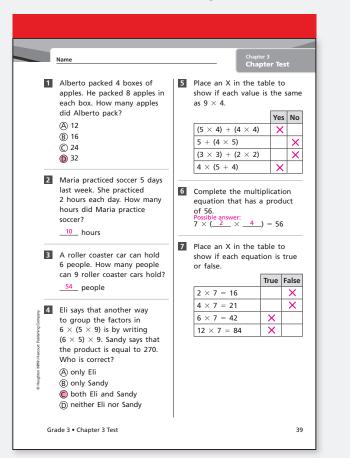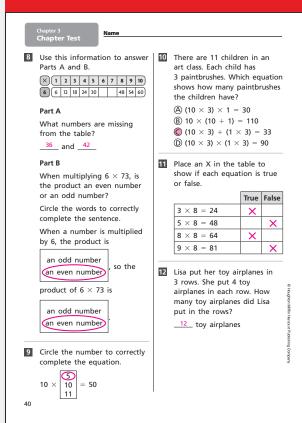**Name** _____

1 Alberto packed 4 boxes of apples. He packed 8 apples in each box. How many apples did Alberto pack?

- Ⓐ 12
- Ⓑ 16
- Ⓒ 24
- Ⓓ 32

2 Maria practiced soccer 5 days last week. She practiced 2 hours each day. How many hours did Maria practice soccer?

__10__ hours

3 A roller coaster car can hold 6 people. How many people can 9 roller coaster cars hold?

__54__ people

4 Eli says that another way to group the factors in 6 × (5 × 9) is by writing (6 × 5) × 9. Sandy says that the product is equal to 270. Who is correct?

- Ⓐ only Eli
- Ⓑ only Sandy
- Ⓒ both Eli and Sandy
- Ⓓ neither Eli nor Sandy

5 Place an X in the table to show if each value is the same as 9 × 4.

	Yes	No
(5 × 4) + (4 × 4)	X	
5 + (4 × 5)		X
(3 × 3) + (2 × 2)		X
4 × (5 + 4)	X	

6 Complete the multiplication equation that has a product of 56.
Possible answer:
7 × (__2__ × __4__) = 56

7 Place an X in the table to show if each equation is true or false.

	True	False
2 × 7 = 16		X
4 × 7 = 21		X
6 × 7 = 42	X	
12 × 7 = 84	X	

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Name _____

8 Use this information to answer Parts A and B.

×	1	2	3	4	5	6	7	8	9	10
6	6	12	18	24	30			48	54	60

Part A

What numbers are missing from the table?

__36__ and __42__

Part B

When multiplying 6 × 73, is the product an even number or an odd number?

Circle the words to correctly complete the sentence.

When a number is multiplied by 6, the product is

> an odd number
> (an even number), so the

product of 6 × 73 is

> an odd number
> (an even number).

9 Circle the number to correctly complete the equation.

10 × [5 / 10 / 11] = 50

10 There are 11 children in an art class. Each child has 3 paintbrushes. Which equation shows how many paintbrushes the children have?

- Ⓐ (10 × 3) × 1 = 30
- Ⓑ 10 × (10 + 1) = 110
- Ⓒ (10 × 3) + (1 × 3) = 33
- Ⓓ (10 × 3) × (1 × 3) = 90

11 Place an X in the table to show if each equation is true or false.

	True	False
3 × 8 = 24	X	
5 × 8 = 48		X
8 × 8 = 64	X	
9 × 8 = 81		X

12 Lisa put her toy airplanes in 3 rows. She put 4 toy airplanes in each row. How many toy airplanes did Lisa put in the rows?

__12__ toy airplanes

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Teacher Notes