Teacher's Manual

Support Coach™

4 TARGET Foundational Mathematics

Dear Educator,

We are pleased to provide for you the new edition of *Support Coach*. This program has been built to meet the new, higher standards for Mathematics and contains the rigor that your students will need. We believe you will find it to be an excellent resource for targeted instruction, practice, and assessment.

The Triumph Learning Team

Support Coach, Target: Foundational Mathematics, First Edition, Teacher's Manual, Grade 4
546NATE ISBN-13: 978-1-62928-526-9

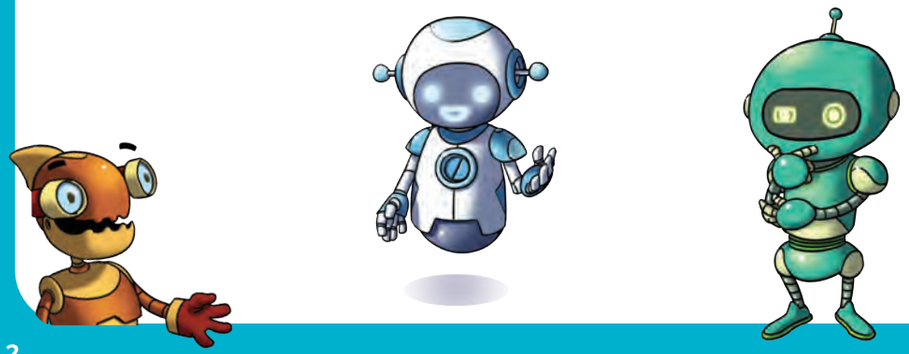
Triumph Learning® 136 Madison Avenue, 7th Floor, New York, NY 10016

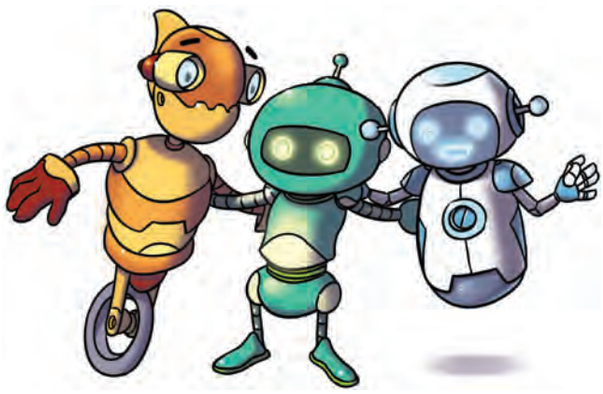
Printed in the United States of America. 10 9 8 7 6 5 4 3 2 1

Contents

Student Edition Contents

Contents





Instructional Overview

This mathematics skills and concepts program provides scaffolded instruction and support for students struggling with grade-level content. Aimed at students requiring strategic intervention—specifically, those students missing a critical foundation for grade-level understandings—*Support Coach* reflects a careful analysis of the prerequisites of key grade-level skills. This means that students will be able to rehearse and review prior skills that will ensure competency at a specific grade.

The program consists of three components:

- Student Edition Worktext
- Comprehensive Teacher's Manual with reduced, annotated Student Edition pages
- Assessment Booklet containing lesson quizzes, two performance tasks for each of the five domains, and two practice tests

Student Edition Overview

The Student Edition features 20 key lessons. While each lesson connects to prior foundational skills and concepts, it can be viewed as an independent unit of instruction. In this way, the 20 lessons allow teachers to differentiate instructions according to the requirements of each student.

Key to the philosophy behind *Support Coach* is the recognition that math skills and concepts are part of a progression that begins early in students' lives and continues beyond their current grade level with increased complexity and depth.

For students, achieving true understanding at any grade level means mastery of prior content that connects to this grade and mastery of content that connects within the grade. Often, students who cannot cope with a specific part of their grade's curriculum are missing one or more understandings that would allow mastery. *Support Coach* supplies the missing pieces.

Lesson Structure

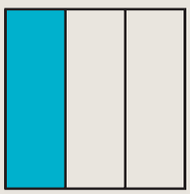
Each lesson is divided into three parts: **Plug In**, **Power Up**, and **Ready to Go**. The first two parts provide students with a review and practice of the prerequisite content necessary for success. The Plug In component reacquaints students with skills and concepts that are foundational to performing at grade level. Power Up picks up from Plug In to add another layer of prerequisite content that ensures a smooth transition to Ready to Go. This section affords an opportunity for instruction. Each part highlights key vocabulary and supplies sufficient practice to ensure mastery before moving forward. Ready to Go, the on-grade-level portion of the lesson, ends with an important emphasis on problem solving.

PLUG IN	POWER UP	GO!
Foundational skill remediating specific content	Transitional skill connects Foundational skill to Target skill	Target skill on grade level

A Lesson Link is included to show both teachers and students how these skills connect!

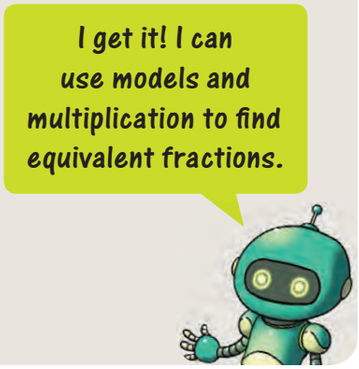
LESSON LINK

PLUG IN	POWER UP	GO!
You can use models to name fractions.	**You can use models and number lines to find equivalent fractions.**	



$\frac{1}{3}$

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

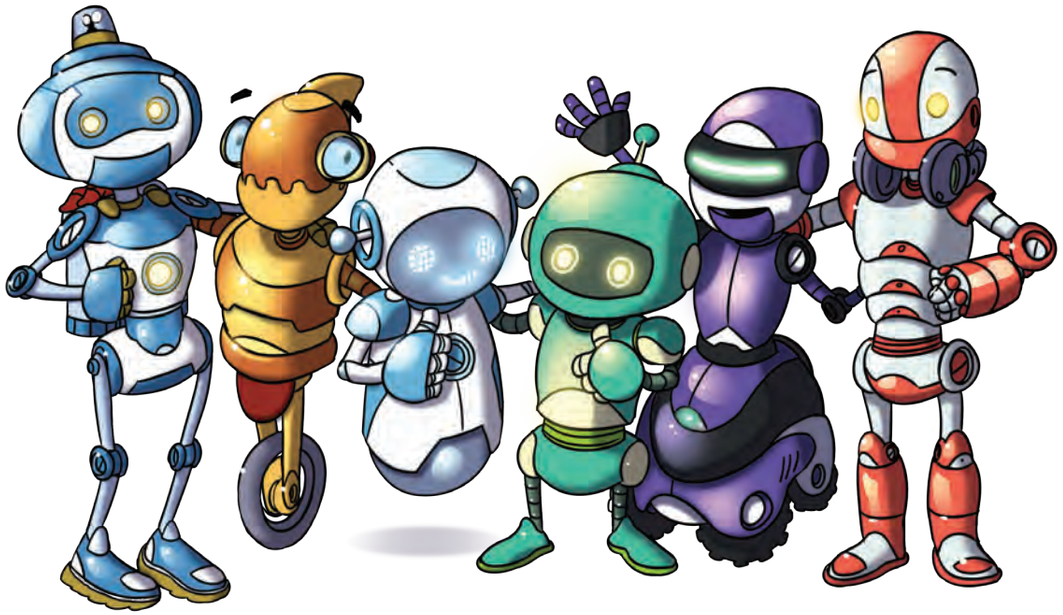


Using Support in the Classroom

The broad outline of *Support Coach*'s features suggests that the best way to use it in your classroom is to take advantage of its versatility. This means that even as *Support Coach* aims to help bring students to grade-level competency, there are many ways to implement it:

- *Support Coach* can be used with any other set of materials you are using for Mathematics.
- The lessons do not have to be taught in a particular sequence.
- You can use *Support Coach* with one or many students at any given time.
- *Support Coach* can be used in the classroom, at home, in after-school programs, and in summer programs.
- You can use several levels of *Support Coach* at any grade to assist students who have missed earlier skills.

The most important aspect of *Support Coach* is that it digs to uncover elements that are missing from the hierarchy of math skills and concepts and assists students who have forgotten or never mastered these elements. This applies to any student who struggles when encountering new content.



Teacher's Manual: An Annotated Guide

Support Coach Teacher's Manual provides all the instructional support you need to help your students achieve mastery of key grade-level skills.

Lessons in this Teacher's Manual include the following features:

- A **Lesson Overview** chart detailing objectives for each section, concepts and skills, and key vocabulary terms
- A list of required and suggested **Materials**
- **Spotlight on Mathematical Practice** notes that support teachers at point-of-use to develop strong mathematical behaviors in their students
- **Spotlight on Mathematical Language** provides a series of prompts using appropriate mathematical language and terms that are designed to elicit similar mathematical language from students
- **English Language Learner** notes included at point-of-use to prepare teachers for the diverse needs of the student population
- **Common Error** notes that provide insight into student misconceptions at point-of-use
- Robust **Discussion Support** that includes Prompts and Sentence Starters to facilitate mathematical discourse
- **Observation-Action tables** that outline how teachers can address specific student needs during independent practice
- A **Lesson Link** that outlines how each section of the lesson connects and works to bring the student to the on-level standard

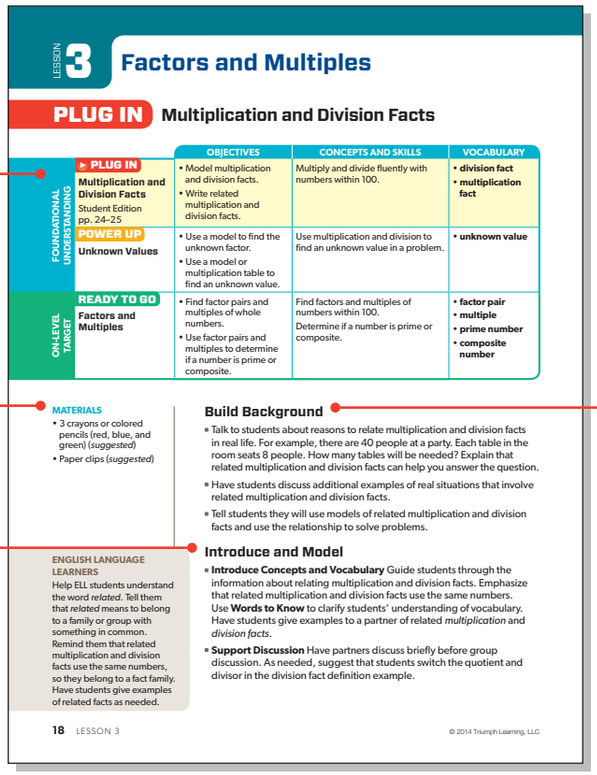
▶ Plug In Pages

The **Lesson Overview** chart saves preparation time.

A breakdown of the lesson's components helps you plan.

The **Materials** list details the required and suggested tools for each section.

Introduce and Model outlines how to introduce a topic and model thinking and problem solving.



LESSON 3

Factors and Multiples

PLUG IN Multiplication and Division Facts

		OBJECTIVES	CONCEPTS AND SKILLS	VOCABULARY
FOUNDATIONAL UNDERSTANDING	▶ PLUG IN **Multiplication and Division Facts** Student Edition pp. 24–25	• Model multiplication and division facts. • Write related multiplication and division facts.	Multiply and divide fluently with numbers within 100.	• **division fact** • **multiplication fact**
	POWER UP **Unknown Values**	• Use a model to find the unknown factor. • Use a model or multiplication table to find an unknown value.	Use multiplication and division to find an unknown value in a problem.	• **unknown value**
ON-LEVEL TARGET	**READY TO GO** **Factors and Multiples**	• Find factor pairs and multiples of whole numbers. • Use factor pairs and multiples to determine if a number is prime or composite.	Find factors and multiples of numbers within 100. Determine if a number is prime or composite.	• **factor pair** • **multiple** • **prime number** • **composite number**

MATERIALS
- 3 crayons or colored pencils (red, blue, and green) (*suggested*)
- Paper clips (*suggested*)

ENGLISH LANGUAGE LEARNERS
Help ELL students understand the word *related*. Tell them that *related* means to belong to a family or group with something in common. Remind them that related multiplication and division facts use the same numbers, so they belong to a fact family. Have students give examples of related facts as needed.

Build Background
- Talk to students about reasons to relate multiplication and division facts in real life. For example, there are 40 people at a party. Each table in the room seats 8 people. How many tables will be needed? Explain that related multiplication and division facts can help you answer the question.
- Have students discuss additional examples of real situations that involve related multiplication and division facts.
- Tell students they will use models of related multiplication and division facts and use the relationship to solve problems.

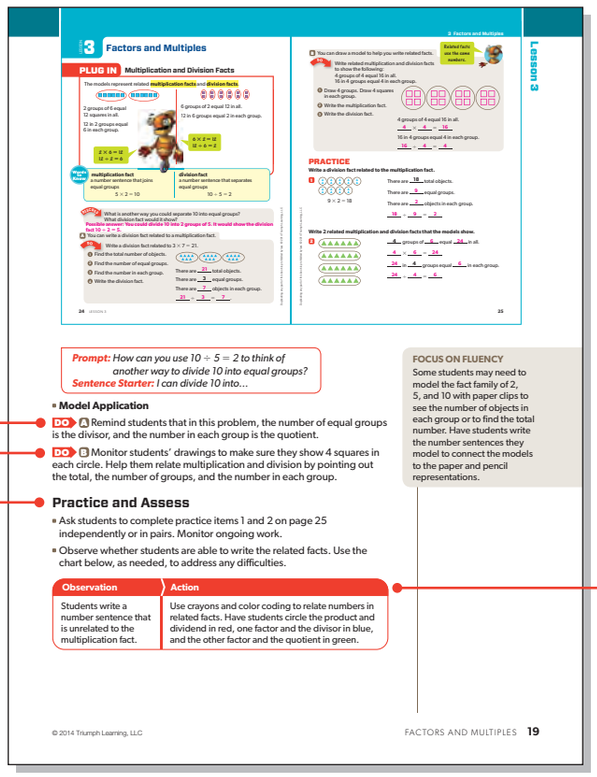
Introduce and Model
- **Introduce Concepts and Vocabulary** Guide students through the information about relating multiplication and division facts. Emphasize that related multiplication and division facts use the same numbers. Use **Words to Know** to clarify students' understanding of vocabulary. Have students give examples to a partner of related *multiplication* and *division facts*.
- **Support Discussion** Have partners discuss briefly before group discussion. As needed, suggest that students switch the quotient and divisor in the division fact definition example.

18 LESSON 3 © 2014 Triumph Learning, LLC

The **Build Background** section provides suggested activities to set up the lesson and assess student preparedness.

Support is included for guiding students through the gradual release of modeling to independent practice.

Each section of the student lesson culminates in an independent practice set.



LESSON 3 Factors and Multiples

PLUG IN Multiplication and Division Facts

Prompt: *How can you use 10 ÷ 5 = 2 to think of another way to divide 10 into equal groups?*
Sentence Starter: *I can divide 10 into…*

Model Application

DO A Remind students that in this problem, the number of equal groups is the divisor, and the number in each group is the quotient.

DO B Monitor students' drawings to make sure they show 4 squares in each circle. Help them relate multiplication and division by pointing out the total, the number of groups, and the number in each group.

FOCUS ON FLUENCY
Some students may need to model the fact family of 2, 5, and 10 with paper clips to see the number of objects in each group or to find the total number. Have students write the number sentences they model to connect the models to the paper and pencil representations.

Practice and Assess
- Ask students to complete practice items 1 and 2 on page 25 independently or in pairs. Monitor ongoing work.
- Observe whether students are able to write the related facts. Use the chart below, as needed, to address any difficulties.

Observation	Action
Students write a number sentence that is unrelated to the multiplication fact.	Use crayons and color coding to relate numbers in related facts. Have students circle the product and dividend in red, one factor and the divisor in blue, and the other factor and the quotient in green.

© 2014 Triumph Learning, LLC FACTORS AND MULTIPLES 19

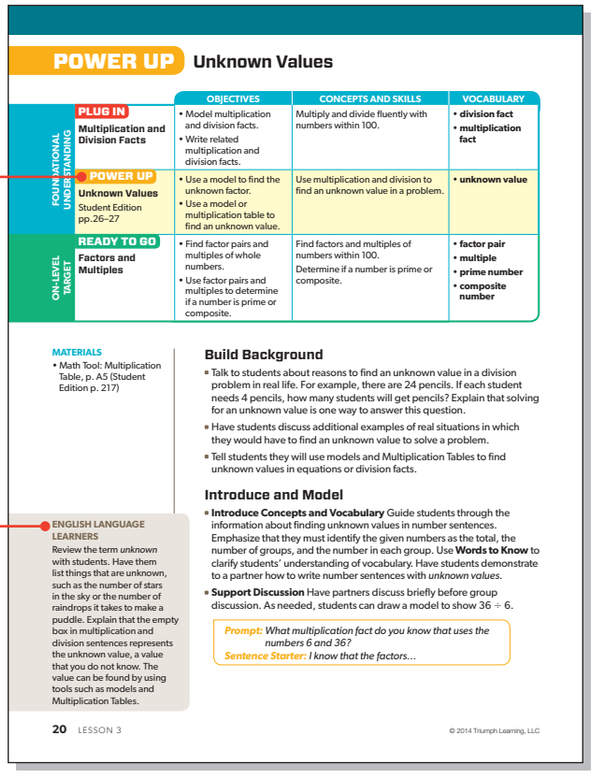
The **Observation-Action table** offers suggestions for addressing certain behaviors students may exhibit during independent practice.

▶ Power Up Pages

Each section of the lesson has specific objectives, concepts and skills, and key vocabulary.

Support for **English Language Learners** is embedded throughout instruction.

Mathematical Discourse is included in every lesson. Prompts and Sentence Starters are outlined to help facilitate discussion.



POWER UP Unknown Values

		OBJECTIVES	CONCEPTS AND SKILLS	VOCABULARY
FOUNDATIONAL UNDERSTANDING	PLUG IN Multiplication and Division Facts	• Model multiplication and division facts. • Write related multiplication and division facts.	Multiply and divide fluently with numbers within 100.	• **division fact** • **multiplication fact**
FOUNDATIONAL UNDERSTANDING	POWER UP Unknown Values Student Edition pp. 26–27	• Use a model to find the unknown factor. • Use a model or multiplication table to find an unknown value.	Use multiplication and division to find an unknown value in a problem.	• **unknown value**
ON-LEVEL TARGET	READY TO GO Factors and Multiples	• Find factor pairs and multiples of whole numbers. • Use factor pairs and multiples to determine if a number is prime or composite.	Find factors and multiples of numbers within 100. Determine if a number is prime or composite.	• **factor pair** • **multiple** • **prime number** • **composite number**

MATERIALS
• Math Tool: Multiplication Table, p. A5 (Student Edition p. 217)

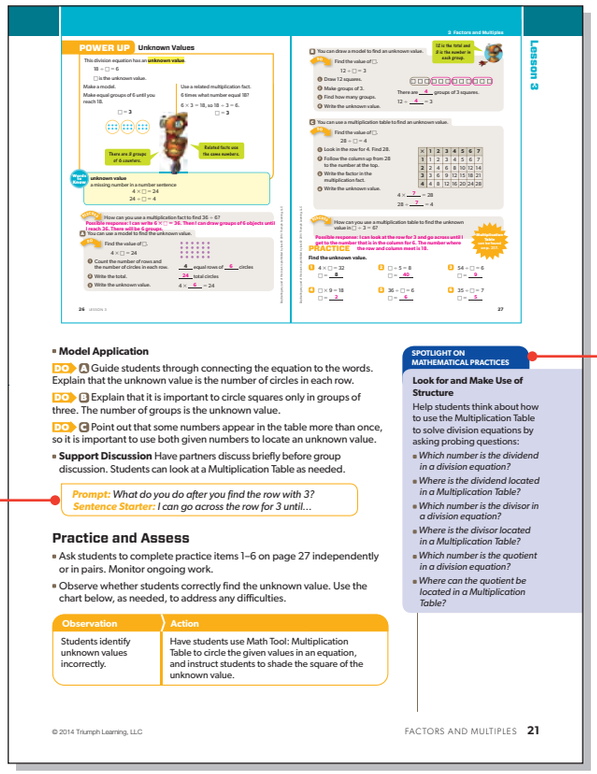
ENGLISH LANGUAGE LEARNERS
Review the term *unknown* with students. Have them list things that are unknown, such as the number of stars in the sky or the number of raindrops it takes to make a puddle. Explain that the empty box in multiplication and division sentences represents the unknown value, a value that you do not know. The value can be found by using tools such as models and Multiplication Tables.

Build Background
- Talk to students about reasons to find an unknown value in a division problem in real life. For example, there are 24 pencils. If each student needs 4 pencils, how many students will get pencils? Explain that solving for an unknown value is one way to answer this question.
- Have students discuss additional examples of real situations in which they would have to find an unknown value to solve a problem.
- Tell students they will use models and Multiplication Tables to find unknown values in equations or division facts.

Introduce and Model
- **Introduce Concepts and Vocabulary** Guide students through the information about finding unknown values in number sentences. Emphasize that they must identify the given numbers as the total, the number of groups, and the number in each group. Use **Words to Know** to clarify students' understanding of vocabulary. Have students demonstrate to a partner how to write number sentences with *unknown values*.
- **Support Discussion** Have partners discuss briefly before group discussion. As needed, students can draw a model to show 36 ÷ 6.

Prompt: What multiplication fact do you know that uses the numbers 6 and 36?
Sentence Starter: I know that the factors…

20 LESSON 3 © 2014 Triumph Learning, LLC



POWER UP Unknown Values

- **Model Application**

DO A Guide students through connecting the equation to the words. Explain that the unknown value is the number of circles in each row.

DO B Explain that it is important to circle squares only in groups of three. The number of groups is the unknown value.

DO C Point out that some numbers appear in the table more than once, so it is important to use both given numbers to locate an unknown value.

- **Support Discussion** Have partners discuss briefly before group discussion. Students can look at a Multiplication Table as needed.

Prompt: What do you do after you find the row with 3?
Sentence Starter: I can go across the row for 3 until…

Practice and Assess
- Ask students to complete practice items 1–6 on page 27 independently or in pairs. Monitor ongoing work.
- Observe whether students correctly find the unknown value. Use the chart below, as needed, to address any difficulties.

Observation	Action
Students identify unknown values incorrectly.	Have students use Math Tool: Multiplication Table to circle the given values in an equation, and instruct students to shade the square of the unknown value.

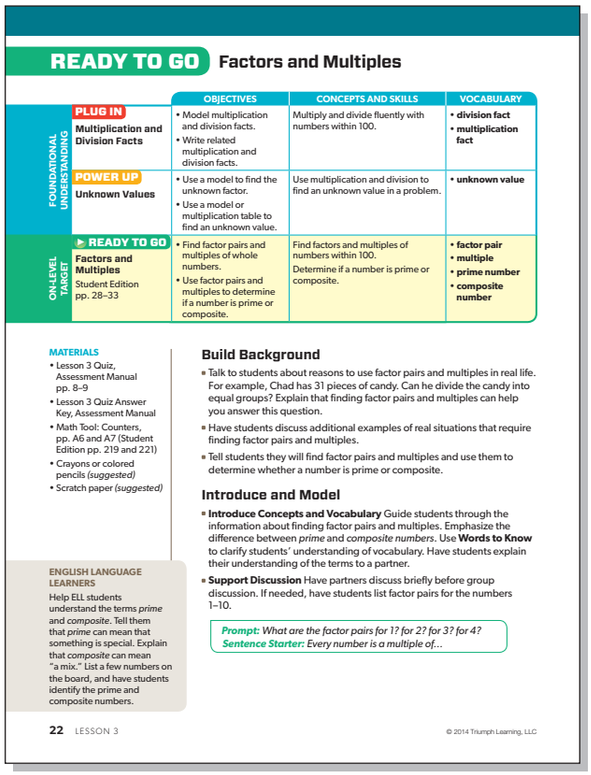
SPOTLIGHT ON MATHEMATICAL PRACTICES

Look for and Make Use of Structure
Help students think about how to use the Multiplication Table to solve division equations by asking probing questions:
- *Which number is the dividend in a division equation?*
- *Where is the dividend located in a Multiplication Table?*
- *Which number is the divisor in a division equation?*
- *Where is the divisor located in a Multiplication Table?*
- *Which number is the quotient in a division equation?*
- *Where can the quotient be located in a Multiplication Table?*

© 2014 Triumph Learning, LLC FACTORS AND MULTIPLES 21

The **Spotlight on Mathematical Practices** box provides embedded professional development.

▶ Ready to Go Pages



READY TO GO Factors and Multiples

		OBJECTIVES	CONCEPTS AND SKILLS	VOCABULARY
FOUNDATIONAL UNDERSTANDING	PLUG IN Multiplication and Division Facts	• Model multiplication and division facts. • Write related multiplication and division facts.	Multiply and divide fluently with numbers within 100.	• **division fact** • **multiplication fact**
	POWER UP Unknown Values	• Use a model to find the unknown factor. • Use a model or multiplication table to find an unknown value.	Use multiplication and division to find an unknown value in a problem.	• **unknown value**
ON-LEVEL TARGET	▶ READY TO GO Factors and Multiples Student Edition pp. 28–33	• Find factor pairs and multiples of whole numbers. • Use factor pairs and multiples to determine if a number is prime or composite.	Find factors and multiples of numbers within 100. Determine if a number is prime or composite.	• **factor pair** • **multiple** • **prime number** • **composite number**

MATERIALS
- Lesson 3 Quiz, Assessment Manual pp. 8–9
- Lesson 3 Quiz Answer Key, Assessment Manual
- Math Tool: Counters, pp. A6 and A7 (Student Edition pp. 219 and 221)
- Crayons or colored pencils *(suggested)*
- Scratch paper *(suggested)*

ENGLISH LANGUAGE LEARNERS
Help ELL students understand the terms *prime* and *composite*. Tell them that *prime* can mean that something is special. Explain that *composite* can mean "a mix." List a few numbers on the board, and have students identify the prime and composite numbers.

Build Background
- Talk to students about reasons to use factor pairs and multiples in real life. For example, Chad has 31 pieces of candy. Can he divide the candy into equal groups? Explain that finding factor pairs and multiples can help you answer this question.
- Have students discuss additional examples of real situations that require finding factor pairs and multiples.
- Tell students they will find factor pairs and multiples and use them to determine whether a number is prime or composite.

Introduce and Model
- **Introduce Concepts and Vocabulary** Guide students through the information about finding factor pairs and multiples. Emphasize the difference between *prime* and *composite numbers*. Use **Words to Know** to clarify students' understanding of vocabulary. Have students explain their understanding of the terms to a partner.
- **Support Discussion** Have partners discuss briefly before group discussion. If needed, have students list factor pairs for the numbers 1–10.

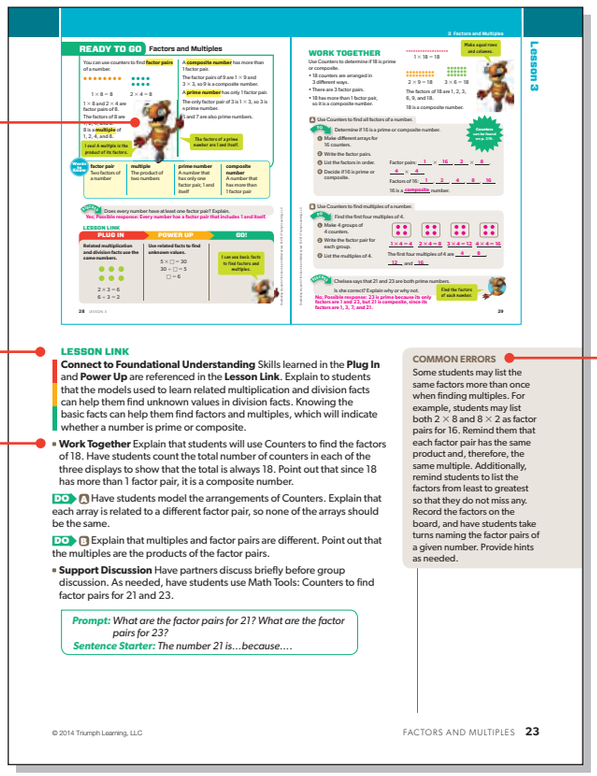
Prompt: *What are the factor pairs for 1? for 2? for 3? for 4?*
Sentence Starter: *Every number is a multiple of…*

22 LESSON 3 © 2014 Triumph Learning, LLC

The Support Coach Avatars model exemplary student thinking, questioning, and problem solving!

The **Lesson Link** connects the foundational skills from the Plug In and Power Up sections to the on-level standard in the Ready to Go section.

The **Ready to Go** section of the lesson often furnishes an opportunity for students to work together.



LESSON LINK
Connect to Foundational Understanding Skills learned in the **Plug In** and **Power Up** are referenced in the **Lesson Link**. Explain to students that the models used to learn related multiplication and division facts can help them find unknown values in division facts. Knowing the basic facts can help them find factors and multiples, which will indicate whether a number is prime or composite.

- **Work Together** Explain that students will use Counters to find the factors of 18. Have students count the total number of counters in each of the three displays to show that the total is always 18. Point out that since 18 has more than 1 factor pair, it is a composite number.

DO A Have students model the arrangements of Counters. Explain that each array is related to a different factor pair, so none of the arrays should be the same.

DO B Explain that multiples and factor pairs are different. Point out that the multiples are the products of the factor pairs.

- **Support Discussion** Have partners discuss briefly before group discussion. As needed, have students use Math Tools: Counters to find factor pairs for 21 and 23.

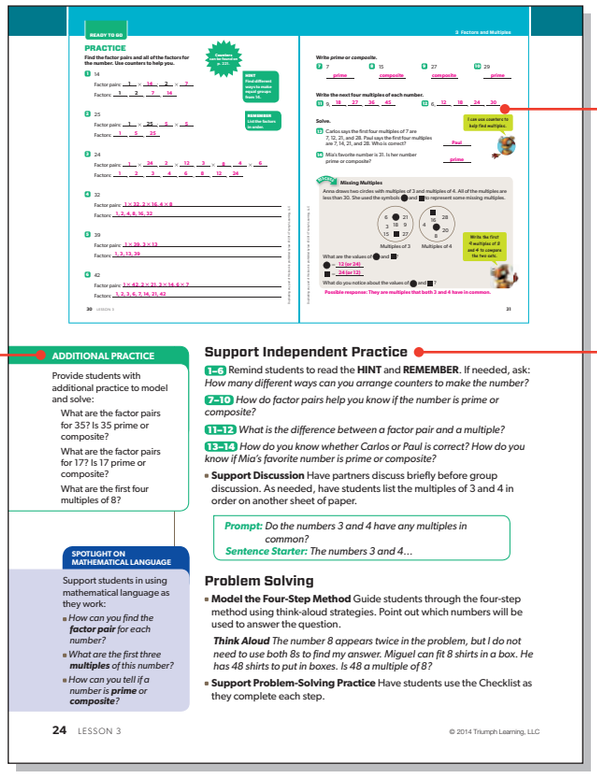
Prompt: *What are the factor pairs for 21? What are the factor pairs for 23?*
Sentence Starter: *The number 21 is…because….*

COMMON ERRORS
Some students may list the same factors more than once when finding multiples. For example, students may list both 2×8 and 8×2 as factor pairs for 16. Remind them that each factor pair has the same product and, therefore, the same multiple. Additionally, remind students to list the factors from least to greatest so that they do not miss any. Record the factors on the board, and have students take turns naming the factor pairs of a given number. Provide hints as needed.

Alongside instruction, teachers are alerted to **Common Errors** they might encounter in student work or discussion. Suggestions are included for addressing the misconceptions that might cause these errors.

© 2014 Triumph Learning, LLC FACTORS AND MULTIPLES 23

▶ Ready to Go Pages

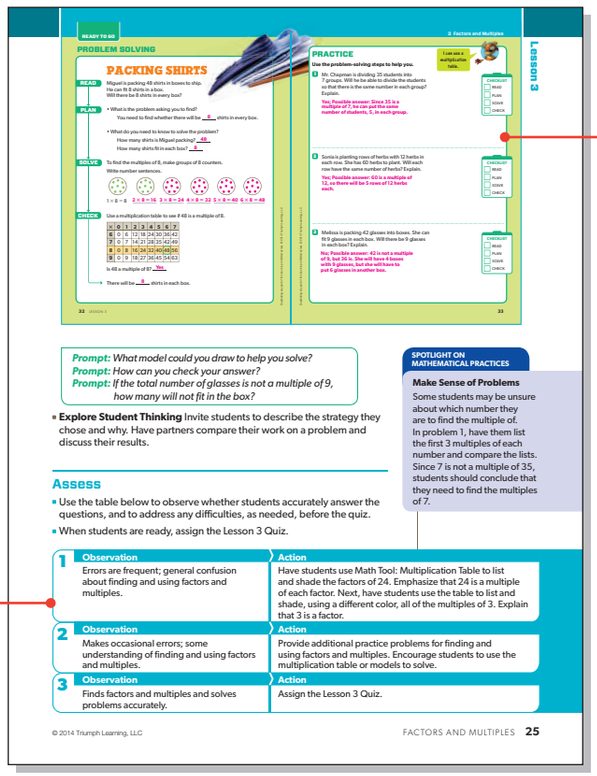


Suggestions for **Additional Practice** are provided for each lesson.

Full support is provided for modeling the **Four-Step Method** for problem solving in the context of each lesson.

The Ready to Go part of each lesson includes a robust section of **Independent Practice**.

To help **Support Independent Practice**, teachers are supplied with suggestions for helping students who are struggling with specific items.



A three-part **Observation-Action table** can be used to determine whether students need more time with the lesson content or can move on to the Lesson Quiz.

Two full pages are dedicated to **Problem Solving**, giving students the opportunity to apply their newly acquired conceptual understandings and procedural fluencies to contextualized problem situations.

Assessments

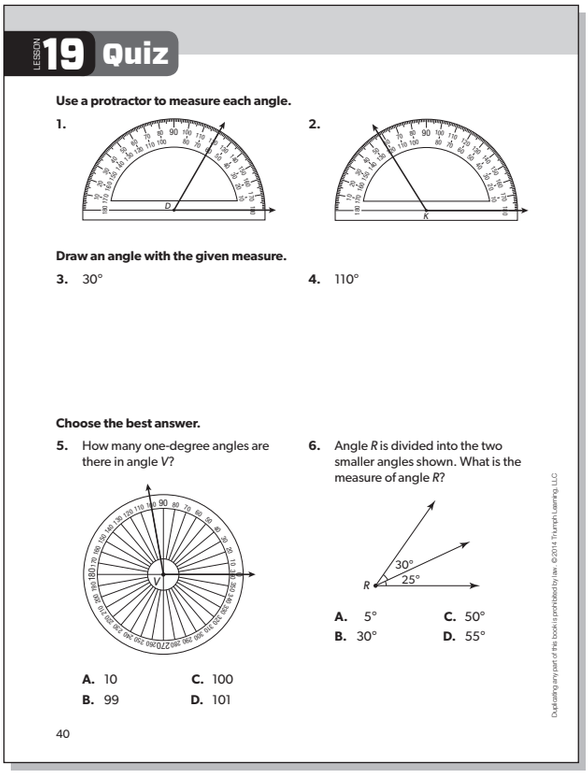
The Assessment Booklet contains lesson quizzes, two performance tasks for each of the five domains, and two practice tests.

Each Lesson Quiz helps you evaluate students' understanding of the skills taught in the lesson and determine whether they are prepared to move on to new material.

There are ten Performance Tasks in the Assessment Booklet. The two Performance Tasks have a task-specific rubric. The first of the two tasks is a bit easier than the second—which allows teachers to differentiate instruction on performance task practice.

Practice Test 1 can be administered before students begin the lessons in the Student Edition. The results allow you to establish a baseline measure of students' mathematics proficiency before starting the Student Edition lessons. You can then use Practice Test 2 to measure students' progress after completing the program.

The answer keys for the Lesson Quizzes, Performance Tasks, and Practice Tests identify the correct answers.



LESSON 19 Quiz

Use a protractor to measure each angle.

1.

2.

Draw an angle with the given measure.

3. 30°

4. 110°

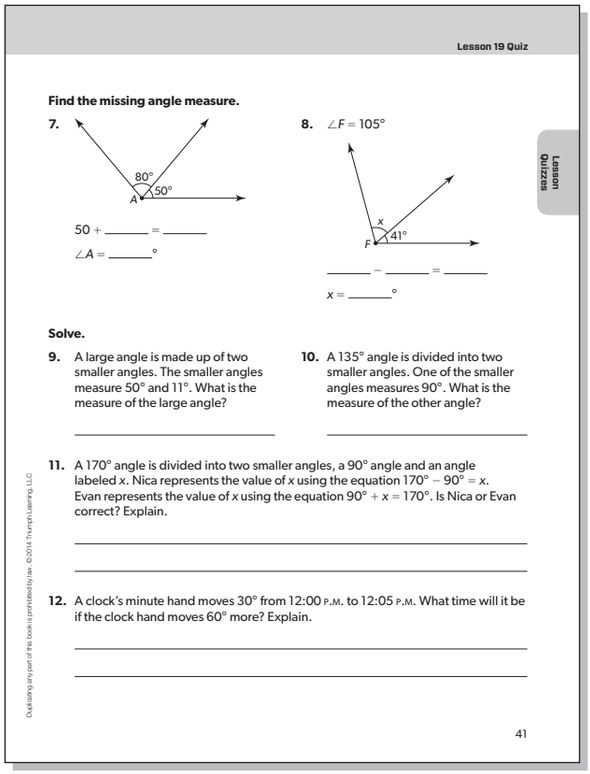
Choose the best answer.

5. How many one-degree angles are there in angle *V*?

A. 10 **C.** 100
B. 99 **D.** 101

6. Angle *R* is divided into the two smaller angles shown. What is the measure of angle *R*?

A. 5° **C.** 50°
B. 30° **D.** 55°



Find the missing angle measure.

7.

50 + _____ = _____

∠*A* = _____°

8. ∠*F* = 105°

_____ − _____ = _____

x = _____°

Solve.

9. A large angle is made up of two smaller angles. The smaller angles measure 50° and 11°. What is the measure of the large angle?

_____

10. A 135° angle is divided into two smaller angles. One of the smaller angles measures 90°. What is the measure of the other angle?

_____

11. A 170° angle is divided into two smaller angles, a 90° angle and an angle labeled *x*. Nica represents the value of *x* using the equation 170° − 90° = *x*. Evan represents the value of *x* using the equation 90° + *x* = 170°. Is Nica or Evan correct? Explain.

_____

_____

12. A clock's minute hand moves 30° from 12:00 P.M. to 12:05 P.M. What time will it be if the clock hand moves 60° more? Explain.

_____

_____

LESSON 1

Multiplicative Comparisons

PLUG IN Multiplication and Division Facts

		OBJECTIVES	CONCEPTS AND SKILLS	VOCABULARY
FOUNDATIONAL UNDERSTANDING	**PLUG IN** **Multiplication and Division Facts** Student Edition pp. 4–5	• Use repeated addition to find a product. • Use repeated subtraction to find a quotient. • Use a related multiplication fact to find a quotient.	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division.	• **product** • **quotient** • **fact family**
	POWER UP **Multiplication as a Comparison**	• Compare groups to show multiplication. • Write multiplication sentences to compare numbers.	Interpret a multiplication equation as a comparison of two numbers. Represent statements of multiplicative comparisons as multiplication equations.	
ON-LEVEL TARGET	**READY TO GO** **Multiplicative Comparisons**	• Multiply to solve comparison word problems.	Multiply to solve word problems involving multiplicative comparison.	• **equation** • **factors**

MATERIALS

- Math Tool: Counters, p. A8 (Student Edition p. 223)

ENGLISH LANGUAGE LEARNERS

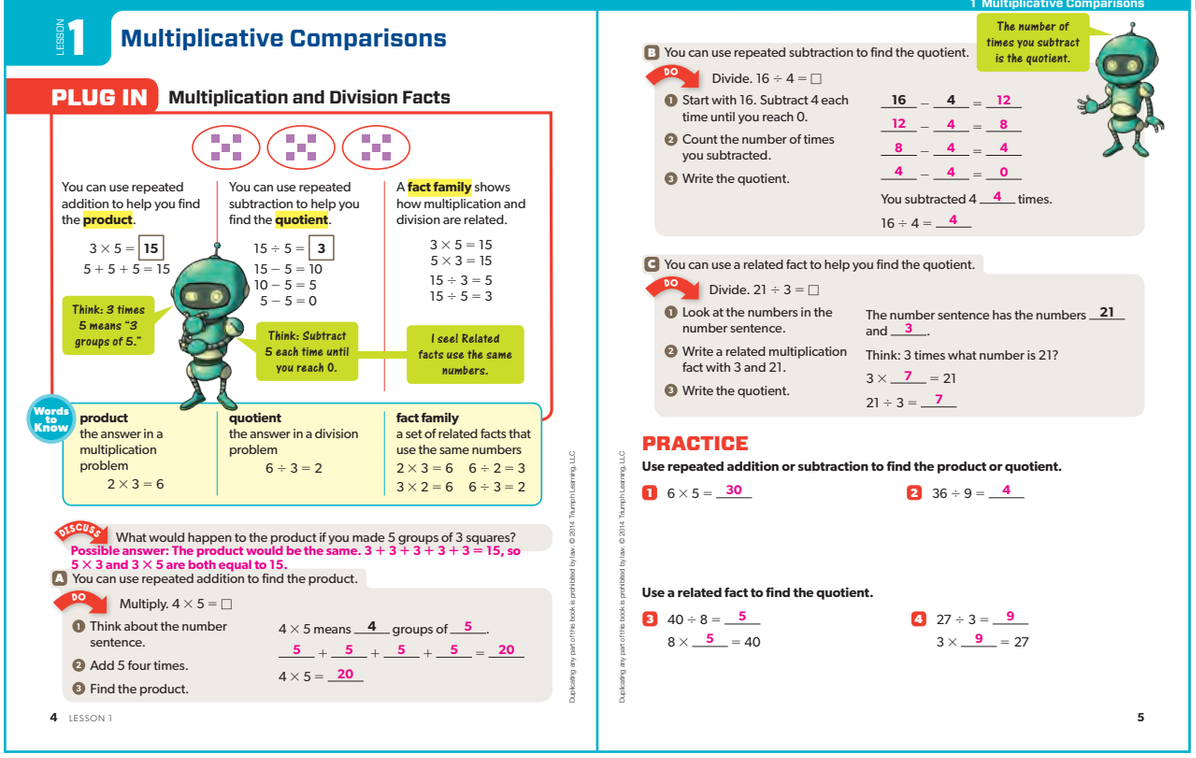
ELL students may need extra support understanding the terms "multiplication" and "division." Help students make the connection of the words "multiply" to "multiplication" and "divide" to "division."

Build Background

- Talk to students about real-life reasons to use multiplication and division facts. For example, you need 16 plates. There are 8 plates in each package. How many packages should you buy? Explain that related facts can help you answer that question.
- Have students discuss additional examples of real situations that involve using multiplication facts to solve division problems.
- Tell students that they will use different strategies to find products and quotients.

Introduce and Model

- **Introduce Concepts and Vocabulary** Guide students through the information about repeated addition, repeated subtraction, and fact families. Emphasize that multiplication and division are related operations. Use **Words to Know** to clarify students' understanding of vocabulary. Have students demonstrate to a partner their understanding of the concepts of *product, quotient*, and *fact families*.
- **Support Discussion** Have partners discuss briefly before group discussion. As needed, remind students that the order of the numbers changed but the operation did not.



LESSON 1 Multiplicative Comparisons

PLUG IN Multiplication and Division Facts

You can use repeated addition to help you find the **product**.

$3 \times 5 = \boxed{15}$
$5 + 5 + 5 = 15$

You can use repeated subtraction to help you find the **quotient**.

$15 \div 5 = \boxed{3}$
$15 - 5 = 10$
$10 - 5 = 5$
$5 - 5 = 0$

A **fact family** shows how multiplication and division are related.

$3 \times 5 = 15$
$5 \times 3 = 15$
$15 \div 3 = 5$
$15 \div 5 = 3$

Think: 3 times 5 means "3 groups of 5."

Think: Subtract 5 each time until you reach 0.

I see! Related facts use the same numbers.

Words to Know

product the answer in a multiplication problem $2 \times 3 = 6$

quotient the answer in a division problem $6 \div 3 = 2$

fact family a set of related facts that use the same numbers $2 \times 3 = 6$ $6 \div 2 = 3$ $3 \times 2 = 6$ $6 \div 3 = 2$

DISCUSS What would happen to the product if you made 5 groups of 3 squares?
Possible answer: The product would be the same. $3 + 3 + 3 + 3 + 3 = 15$, so 5×3 and 3×5 are both equal to 15.

A You can use repeated addition to find the product.

DO Multiply. $4 \times 5 = \square$

1. Think about the number sentence.
2. Add 5 four times.
3. Find the product.

4 × 5 means 4 groups of 5.
5 + 5 + 5 + 5 = 20
4 × 5 = 20

4 LESSON 1

1 Multiplicative Comparisons

B You can use repeated subtraction to find the quotient.

The number of times you subtract is the quotient.

DO Divide. $16 \div 4 = \square$

1. Start with 16. Subtract 4 each time until you reach 0.
2. Count the number of times you subtracted.
3. Write the quotient.

16 − 4 = 12
12 − 4 = 8
8 − 4 = 4
4 − 4 = 0
You subtracted 4 times.
16 ÷ 4 = 4

C You can use a related fact to help you find the quotient.

DO Divide. $21 \div 3 = \square$

1. Look at the numbers in the number sentence.
2. Write a related multiplication fact with 3 and 21.
3. Write the quotient.

The number sentence has the numbers 21 and 3.
Think: 3 times what number is 21?
3 × 7 = 21
21 ÷ 3 = 7

PRACTICE

Use repeated addition or subtraction to find the product or quotient.

1. $6 \times 5 =$ 30
2. $36 \div 9 =$ 4

Use a related fact to find the quotient.

3. $40 \div 8 =$ 5 ($8 \times$ 5 = 40)
4. $27 \div 3 =$ 9 ($3 \times$ 9 = 27)

5

Lesson 1

Prompt: *What numbers could you add together to find the product of 5 × 3?*
Sentence Starter: *You can add the numbers…*

Model Application

DO A Guide students through using repeated addition to find the product. Explain that the first number tells you how many times to add the second number to itself.

DO B Remind students that they can use repeated subtraction to find the quotient. Emphasize that the divisor tells you the number to subtract.

DO C Monitor to make sure that students are using the correct multiplication fact to find the quotient.

Practice and Assess

- Ask students to complete practice items 1–4 on page 5 independently or in pairs. Monitor ongoing work.
- Observe whether students are using repeated addition to find products and using repeated subtraction and related multiplication facts to find quotients. Use the chart below, as needed, to address any difficulties.

Observation	Action
Students use an unrelated multiplication fact to complete the division fact.	Have students use Math Tool: Counters to model the given division fact. Then write the related multiplication fact by using the number of counters in each group and the number of groups.

SPOTLIGHT ON MATHEMATICAL LANGUAGE

Support students in using mathematical language as they work:

- *I will use repeated addition to find the* ***product.***
- *I will use repeated subtraction to find the* ***quotient.***
- *Which numbers are in this* ***fact family?***

POWER UP Multiplication as a Comparison

		OBJECTIVES	CONCEPTS AND SKILLS	VOCABULARY
FOUNDATIONAL UNDERSTANDING	**PLUG IN** **Multiplication and Division Facts**	• Use repeated addition to find a product. • Use repeated subtraction to find a quotient. • Use a related multiplication fact to find a quotient.	Fluently multiply and divide within 100. Understand the relationship between multiplication and division.	• **product** • **quotient** • **fact family**
	POWER UP **Multiplication as a Comparison** Student Edition pp. 6–7	• Compare groups to show multiplication. • Write multiplication sentences to compare numbers.	Compare groups to show multiplication. Represent statements of multiplicative comparisons as multiplicative equations.	
ON-LEVEL TARGET	**READY TO GO** **Multiplicative Comparisons**	• Multiply to solve comparison word problems.	Multiply to solve word problems involving multiplicative comparison.	• **equation** • **factors**

MATERIALS

- Math Tool: Grouping Mat, p. A4 (Student Edition p. 215)
- Math Tool: Counters, p. A8 (Student Edition p. 223)

ENGLISH LANGUAGE LEARNERS

Use Math Tool: Counters to model comparing groups to show multiplication. Compare 1 group of 2 counters and 3 groups of 2 counters. Explain that the second group has 3 times as many counters as the first group. Emphasize the meaning of "3 times as many as."

Build Background

- Talk to students about real-life reasons to think of multiplication as a comparison. For example, Alisha has 3 bracelets. Jessica has 2 times as many bracelets as Alisha. How many bracelets does Jessica have? Explain that this comparison can be solved with a multiplication sentence.
- Encourage students to discuss additional examples of real situations in which a comparison can be solved with a multiplication sentence.
- Tell students they will compare groups to show multiplication and use comparisons to write multiplication sentences.

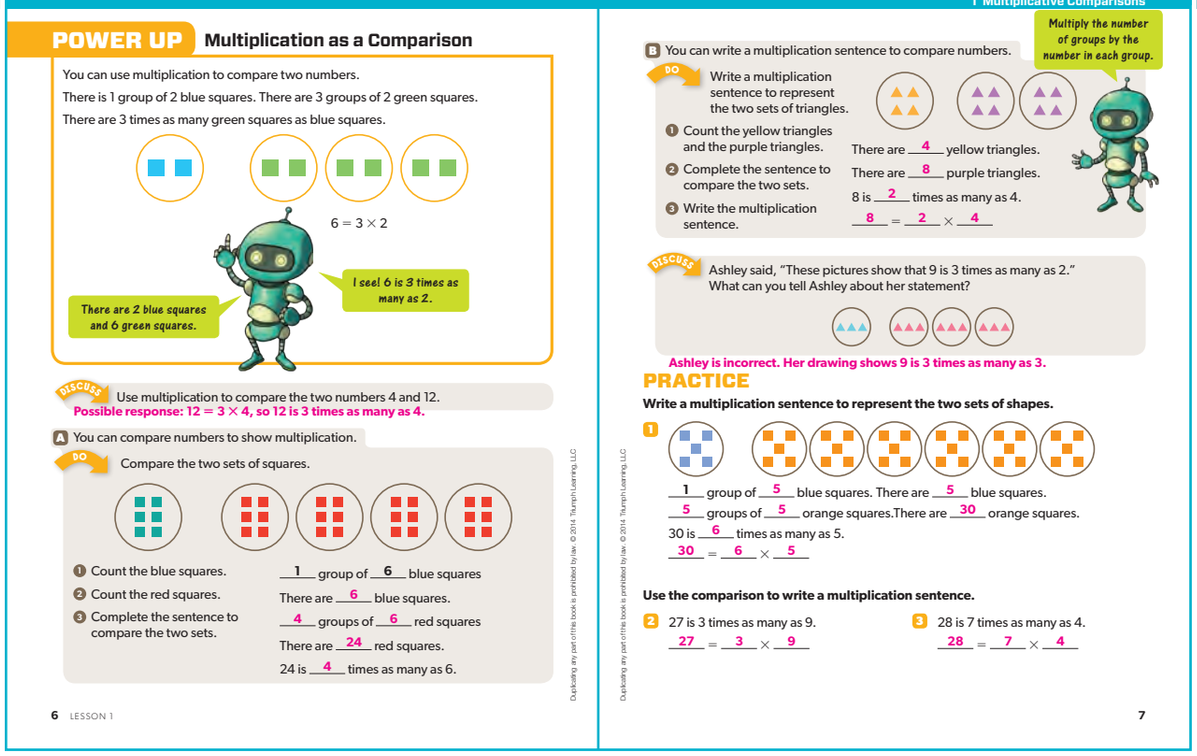
Introduce and Model

- **Introduce Concepts** Guide students through the information about using multiplication to compare two numbers. Emphasize that the number in each group is being multiplied by the number of groups.
- **Support Discussion** Have partners discuss briefly before group discussion. Students can use counters to model the problem if needed.

> ***Prompt:*** *12 is how many times 4? 12 is how many groups of 4?*
> ***Sentence Starter:*** *The total of 12 is made up of...*

- **Model Application**

DO A Guide students through comparing groups to show multiplication. Monitor that students correctly differentiate between the number of groups and the number in each group.



POWER UP Multiplication as a Comparison

You can use multiplication to compare two numbers.

There is 1 group of 2 blue squares. There are 3 groups of 2 green squares.

There are 3 times as many green squares as blue squares.

6 = 3 × 2

There are 2 blue squares and 6 green squares.

I see! 6 is 3 times as many as 2.

DISCUSS Use multiplication to compare the two numbers 4 and 12.

Possible response: 12 = 3 × 4, so 12 is 3 times as many as 4.

A You can compare numbers to show multiplication.

DO Compare the two sets of squares.

1. Count the blue squares.
2. Count the red squares.
3. Complete the sentence to compare the two sets.

1 group of 6 blue squares

There are 6 blue squares.

4 groups of 6 red squares

There are 24 red squares.

24 is 4 times as many as 6.

6 LESSON 1

B You can write a multiplication sentence to compare numbers.

Multiply the number of groups by the number in each group.

DO Write a multiplication sentence to represent the two sets of triangles.

1. Count the yellow triangles and the purple triangles.
2. Complete the sentence to compare the two sets.
3. Write the multiplication sentence.

There are 4 yellow triangles.

There are 8 purple triangles.

8 is 2 times as many as 4.

8 = 2 × 4

DISCUSS Ashley said, "These pictures show that 9 is 3 times as many as 2." What can you tell Ashley about her statement?

Ashley is incorrect. Her drawing shows 9 is 3 times as many as 3.

PRACTICE

Write a multiplication sentence to represent the two sets of shapes.

1

1 group of 5 blue squares. There are 5 blue squares.

5 groups of 5 orange squares. There are 30 orange squares.

30 is 6 times as many as 5.

30 = 6 × 5

Use the comparison to write a multiplication sentence.

2 27 is 3 times as many as 9.

27 = 3 × 9

3 28 is 7 times as many as 4.

28 = 7 × 4

7

DO B Explain that a comparison can be used to write a multiplication sentence. Monitor that students understand that the numbers 4 and 8 are being compared and that the number of purple triangles (8) is 2 times as many triangles as the number of yellow triangles (4).

- **Support Discussion** Have partners discuss briefly before group discussion. As needed, remind students that "3 times as many as 2" means 3 groups with 2 in each group.

> ***Prompt:*** *To show 3 times as many as 2, how many triangles should Ashley put in each group?*
>
> ***Sentence Starter:*** *To show 3 groups of 2, each group should have…*

Practice and Assess

- Ask students to complete practice items 1–3 on page 7 independently or in pairs. Monitor ongoing work.
- Observe whether students correctly relate each multiplication sentence and comparison. Use the chart below, as needed, to address any difficulties.

Observation	Action
Students confuse the number of groups and the number in each group.	Have students use Math Tool: Counters and Math Tool: Grouping Mat to model the problem. Check that each section of the mat has the same number of counters.

SPOTLIGHT ON MATHEMATICAL PRACTICES

Attend to Precision

Help students compare the two numbers. Ask: *12 is how many times as many as 4?*

READY TO GO Multiplicative Comparisons

		OBJECTIVES	CONCEPTS AND SKILLS	VOCABULARY
FOUNDATIONAL UNDERSTANDING	**PLUG IN** **Multiplication and Division Facts**	• Use repeated addition to find a product. • Use repeated subtraction to find a quotient. • Use a related multiplication fact to find a quotient.	Fluently multiply and divide within 100. Understand the relationship between multiplication and division.	• **product** • **quotient** • **fact family**
	POWER UP **Multiplication as a Comparison**	• Compare groups to show multiplication. • Write multiplication sentences to compare numbers.	Compare groups to show multiplication. Represent statements of multiplicative comparisons as multiplicative equations.	
ON-LEVEL TARGET	**READY TO GO** **Multiplicative Comparisons** Student Edition pp. 8–13	• Multiply to solve comparison word problems.	Multiply to solve word problems involving multiplicative comparison.	• **equation** • **factors**

MATERIALS

- Lesson 1 Quiz, Assessment Manual pp. 4–5
- Lesson 1 Quiz Answer Key, Assessment Manual
- Math Tool: Grouping Mat, pp. A2 and A3 (Student Edition pp. 211 and 213)
- Math Tool: Multiplication Table, p. A5 (Student Edition p. 217)
- Math Tool: Counters, p. A8 (Student Edition p. 223)

ENGLISH LANGUAGE LEARNERS

Provide ELL students extra support with understanding the meaning of comparison word problems. Point out the word "compare" and relate to the word "comparison."

Build Background

- Talk to students about reasons to use multiplication to solve comparisons in real life. For example, Erika gives away 3 pencils on Monday and 5 times as many on Tuesday. How many pencils does Erika give away on Tuesday? Explain that multiplication can be used to answer this comparison question.
- Have students discuss additional examples of real comparisons that require using multiplication to solve them.
- Tell students they will use multiplication to solve comparison word problems.

Introduce and Model

- **Introduce Concepts and Vocabulary** Guide students through the information about comparisons. Emphasize that they will be writing equations and using models to solve comparison problems. Use **Words to Know** to clarify students' understanding of vocabulary. Have students describe the meaning of *equation* and *factors* to a partner.
- **Support Discussion** Have partners discuss briefly before group discussion. If needed, have students state *16 is 4 times as many as what number* before making up a word problem.

Prompt: *In the multiplication equation, the product is 4 times as many as what factor?*
Sentence Starter: *The product is…*

READY TO GO Multiplicative Comparisons

Ava has 3 stickers. Kylie has 4 times as many stickers as Ava.
How many stickers does Kylie have?

Write an **equation** to represent the problem.

Use △ to stand for Kylie's stickers.
Use 4 and 3 as **factors**.

△ is 4 times as many as 3.
△ = 4 × 3
△ = 12

Make a drawing to model the problem.

Kylie has 12 stickers.

Words to Know

equation
a number sentence with an equal sign (=)
4 × 3 = □
□ = 4 × 3

factors
the numbers you multiply
3 × 2 = 6
factors

DISCUSS Make a comparison word problem using the number sentence 4 × 4 = 16.

Word problem will vary. Possible word problem: I have 4 pencils. My friend has 4 times as many pencils as me. My friend has 16 pencils.

LESSON LINK

PLUG IN

There are many ways to find products and quotients.

2 × 4 = 8
8 ÷ 4 = 2

POWER UP

Multiplication can compare two numbers.

6 is 3 times as many as 2
6 = 3 × 2

GO!

I see! I can use multiplication to solve comparison problems.

WORK TOGETHER

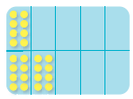
Write an equation to solve. Use a Grouping Mat and draw counters to model the problem.

- The equation □ = 2 × 8 represents the problem.
- The top row shows Michael's cards. He has 8 cards.
- The bottom row shows Isa's cards. She has twice as many as 8.

Isa bought 16 cards.

Michael bought 8 cards. Isa bought twice as many cards as Michael. How many cards did Isa buy?

Use □ to stand for Isa's cards.



□ is twice as many as 8.
□ = 2 × 8
□ = 16

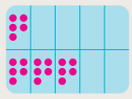
Grouping Mat can be found on p. 211.

A Use a Grouping Mat and draw counters to model the problem.

DO Write an equation and solve.
A small rug is 5 feet long. A big rug is 3 times as long as the small rug. How many feet long is the big rug?

1. Use a symbol to represent the number you need to find.
2. Write the equation.
3. Multiply and solve.
4. Model the problem.

Use △ to stand for the length of the big rug.
△ is 3 times as long as 5 feet.
△ = 3 × 5
△ = 15



The big rug is 15 feet long.

DISCUSS Jerome said "14 is 6 times as many as 2." How can Jerome check his answer?

I can make a model.

Jerome is not correct. Possible response: He should have said 14 is 7 times as many as 2. Jerome can make a model of 6 times as many as 2.

LESSON LINK

Connect to Foundational Understanding Skills learned in the **Plug In** and **Power Up** are referenced in the **Lesson Link**. Emphasize that there are many ways to find products and quotients, and that multiplication can be thought of as a way of comparing two numbers.

- **Work Together** Explain that students will use a Grouping Mat and counters to show the comparison. Begin by working with students to model 2 × 8 on their Grouping Mats. If needed, draw a Grouping Mat on the board, and model the situation for students.

DO A Monitor students as they model the comparison. As needed, remind students that they are trying to find what number is 3 times as many as 5 because the number of silver coins is 3 times the number (5) of gold coins.

- **Support Discussion** Have partners discuss briefly before group discussion. As needed, have students use counters to model Jerome's comparison.

Prompt: *What is the product of 6 × 2?*
Sentence Starter: *I can model Jerome's comparison with…*

COMMON ERRORS

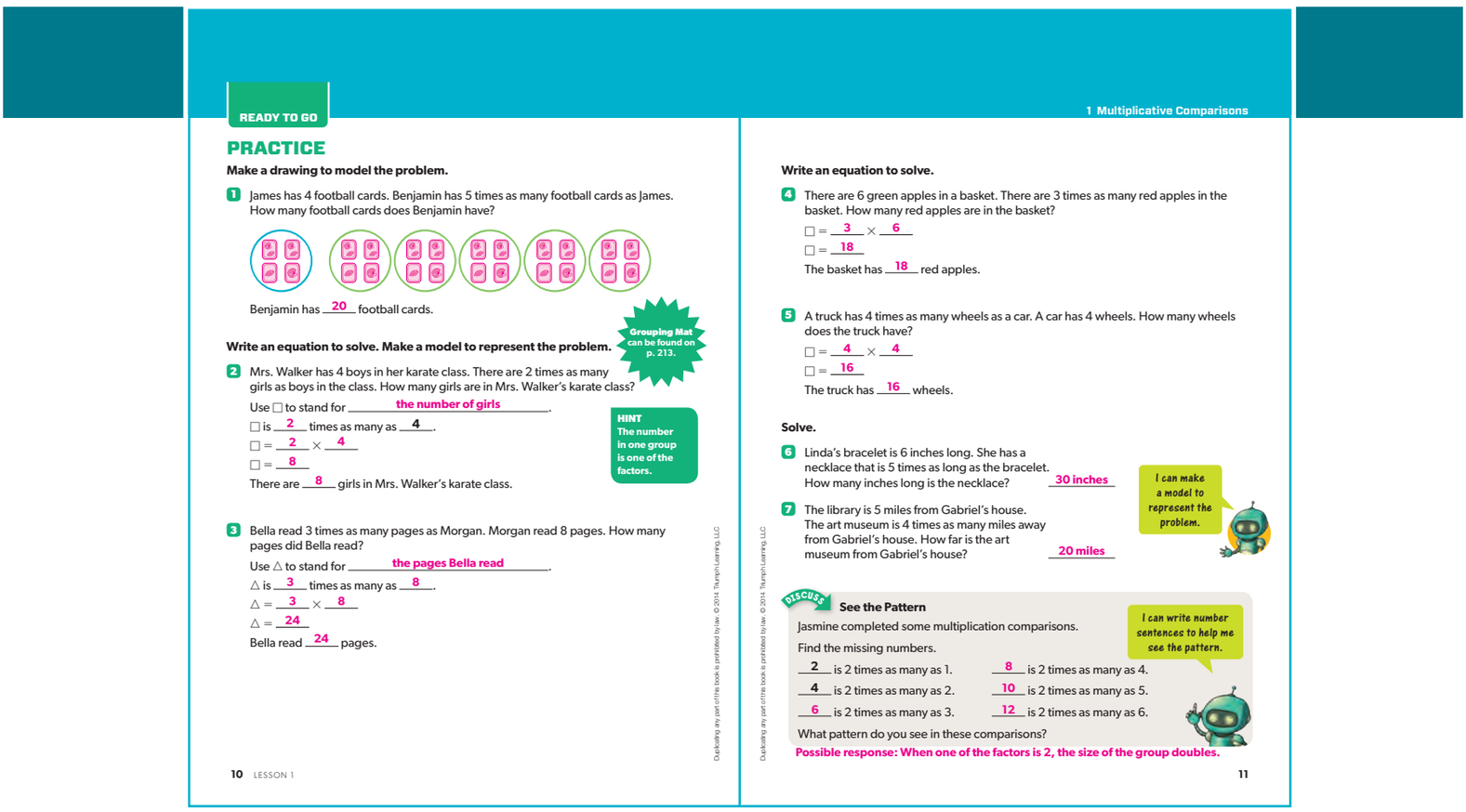
When interpreting multiplication as comparing two numbers, students may confuse the number of groups with the number in each group. Emphasize that 20 = 4 × 5 means that a group of 20 things has 4 times as many things in it as a group that has 5 things in it. Have students model this with Math Tool: Counters.

SPOTLIGHT ON MATHEMATICAL PRACTICES

Critiquing Others' Reasoning

Help students think about Jerome's reasoning critically by asking probing questions:

- *5 times what number is 10?*
- *Can you model Jerome's comparison?*



READY TO GO

1 Multiplicative Comparisons

PRACTICE

Make a drawing to model the problem.

1 James has 4 football cards. Benjamin has 5 times as many football cards as James. How many football cards does Benjamin have?

Benjamin has 20 football cards.

Write an equation to solve. Make a model to represent the problem.

Grouping Mat can be found on p. 213.

2 Mrs. Walker has 4 boys in her karate class. There are 2 times as many girls as boys in the class. How many girls are in Mrs. Walker's karate class?

Use □ to stand for the number of girls.
□ is 2 times as many as 4.
□ = 2 × 4
□ = 8
There are 8 girls in Mrs. Walker's karate class.

HINT
The number in one group is one of the factors.

3 Bella read 3 times as many pages as Morgan. Morgan read 8 pages. How many pages did Bella read?

Use △ to stand for the pages Bella read.
△ is 3 times as many as 8.
△ = 3 × 8
△ = 24
Bella read 24 pages.

10 LESSON 1

Write an equation to solve.

4 There are 6 green apples in a basket. There are 3 times as many red apples in the basket. How many red apples are in the basket?

□ = 3 × 6
□ = 18
The basket has 18 red apples.

5 A truck has 4 times as many wheels as a car. A car has 4 wheels. How many wheels does the truck have?

□ = 4 × 4
□ = 16
The truck has 16 wheels.

Solve.

6 Linda's bracelet is 6 inches long. She has a necklace that is 5 times as long as the bracelet. How many inches long is the necklace? 30 inches

7 The library is 5 miles from Gabriel's house. The art museum is 4 times as many miles away from Gabriel's house. How far is the art museum from Gabriel's house? 20 miles

I can make a model to represent the problem.

DISCUSS

See the Pattern

Jasmine completed some multiplication comparisons.

Find the missing numbers.

2 is 2 times as many as 1. 8 is 2 times as many as 4.
4 is 2 times as many as 2. 10 is 2 times as many as 5.
6 is 2 times as many as 3. 12 is 2 times as many as 6.

I can write number sentences to help me see the pattern.

What pattern do you see in these comparisons?

Possible response: When one of the factors is 2, the size of the group doubles.

11

ADDITIONAL PRACTICE

Provide students with additional practice:

Sam finds 6 shells on the beach. Alex finds 4 times as many shells as Sam. How many shells does Alex find?

Jessica swam for 10 minutes on Friday. She swam 6 times as many minutes on Saturday. How many minutes did Jessica swim on Saturday?

SPOTLIGHT ON MATHEMATICAL LANGUAGE

Support students in using mathematical language as they work:

- *I will write an **equation** to represent the problem.*
- *Which numbers in the comparison are the **factors**?*

Support Independent Practice

1–7 Remind students to read the **HINT**. If needed, ask: *What is being compared in the problem? How many groups are there? How many are in each group?*

Support Discussion Have partners discuss briefly before group discussion. As needed, have students complete the multiplication comparison sentences.

> ***Prompt:*** *Do the comparisons have a pattern?*
> ***Sentence Starter:*** *When one of the factors is 2, the…*

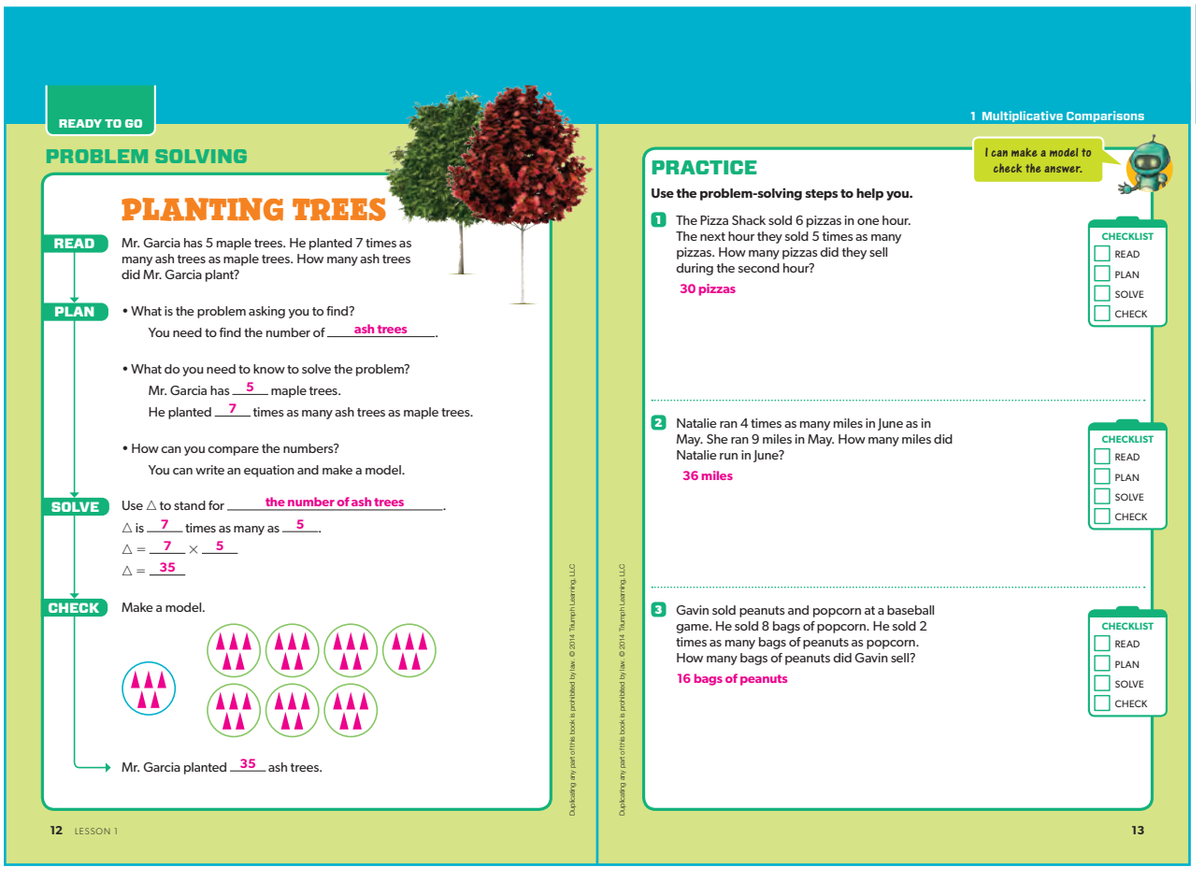
Problem Solving

- **Model the Four-Step Method** Guide students through the four-step method using think-aloud strategies. Point out the comparison clue words *times as many*.

  Think Aloud *Mr. Garcia planted 5 maple trees and 7 times as many ash trees. I need to find how many ash trees he planted.*

- **Support Problem-Solving Practice** Have students use the Checklist as they complete each step.

> ***Prompt:*** *Which numbers are the factors?*
> ***Prompt:*** *How many groups are there?*
> *How many are in each group?*
> ***Prompt:*** *How can you model the problem?*



READY TO GO

PROBLEM SOLVING

PLANTING TREES

READ Mr. Garcia has 5 maple trees. He planted 7 times as many ash trees as maple trees. How many ash trees did Mr. Garcia plant?

PLAN
• What is the problem asking you to find?
You need to find the number of ash trees.
• What do you need to know to solve the problem?
Mr. Garcia has 5 maple trees.
He planted 7 times as many ash trees as maple trees.
• How can you compare the numbers?
You can write an equation and make a model.

SOLVE Use △ to stand for the number of ash trees.
△ is 7 times as many as 5.
△ = 7 × 5
△ = 35

CHECK Make a model.

Mr. Garcia planted 35 ash trees.

12 LESSON 1

Lesson 1

PRACTICE

I can make a model to check the answer.

Use the problem-solving steps to help you.

1 The Pizza Shack sold 6 pizzas in one hour. The next hour they sold 5 times as many pizzas. How many pizzas did they sell during the second hour?
30 pizzas

CHECKLIST
READ
PLAN
SOLVE
CHECK

2 Natalie ran 4 times as many miles in June as in May. She ran 9 miles in May. How many miles did Natalie run in June?
36 miles

CHECKLIST
READ
PLAN
SOLVE
CHECK

3 Gavin sold peanuts and popcorn at a baseball game. He sold 8 bags of popcorn. He sold 2 times as many bags of peanuts as popcorn. How many bags of peanuts did Gavin sell?
16 bags of peanuts

CHECKLIST
READ
PLAN
SOLVE
CHECK

13

- **Explore Student Thinking** Invite students to explain how they used multiplication to solve the problem. Have partners compare their work on the problem and describe their results.

FOCUS ON FLUENCY

Use Math Tool: Multiplication Table to find all multiplication facts that have a product of 12. Continue choosing new products, and ask students to find all the multiplication facts having that product.

Assess

- Use the table below to observe whether students accurately use multiplication to solve comparison word problems, and to address any difficulties, as needed, before the quiz.
- When students are ready, assign the Lesson 1 Quiz.

	Observation	Action
1	Errors in using multiplication to solve comparison word problems are frequent; general confusion about comparison word problems.	Have students use Math Tool: Counters or draw pictures to model each word problem. Have them write the multiplication sentence below each model.
2	Makes occasional errors when using multiplication to solve comparison word problems; some understanding of comparisons.	Provide additional practice problems for solving comparison word problems. Encourage students to model each problem.
3	Accurately uses multiplication to solve comparison word problems.	Assign the Lesson 1 Quiz.