

4•1

Multiples of Equal Groups



Objectives To review multiplication and equal groups; and to provide opportunities to solve and write number stories involving equal groups.

Technology Resources

www.everydaymathonline.com



ePresentations



eToolkit



Algorithms Practice



EM Facts Workshop Game™



Family Letters



Assessment Management



Common Core State Standards



Curriculum Focal Points



Interactive Teacher's Lesson Guide

1 Teaching the Lesson

Key Concepts and Skills

- Use facts to solve multiplication stories. [Operations and Computation Goal 3]
- Use strategies (counters, pictures, or arrays) to compute facts through 10×10 . [Operations and Computation Goal 3]
- Use multiplication diagrams to model number stories involving equal groups. [Operations and Computation Goal 6]

Key Activities

Children use multiplication/division diagrams to solve and write multiplication number stories.



Ongoing Assessment: Recognizing Student Achievement

Use the Math Message. [Operations and Computation Goal 3]



Ongoing Assessment: Informing Instruction

See page 245.

Key Vocabulary

multiplication/division diagram ♦
multiplication ♦ multiples of equal groups

Materials

Math Journal 1, p. 79
Student Reference Book, p. 215
Math Masters, p. 406
transparency of *Math Masters*, p. 419 (optional) ♦ packages of school supplies (optional) ♦ half-sheets of paper ♦ counters (optional) ♦ slate

2 Ongoing Learning & Practice



Minute Math+

Minute Math®, pp. 43, 48, 79, 81, 84, and 90
Children practice multiplication number stories.



Math Boxes 4•1

Math Journal 1, p. 80
Children practice and maintain skills through Math Box problems.



Home Link 4•1

Math Masters, p. 85
Children practice and maintain skills through Home Link activities.

3 Differentiation Options

READINESS

Exploring Equal Groups

Math Masters, p. 86
per partnership: 6 quarter-sheets of paper, crayons, 1 six-sided die, 36 counters, 1 sheet of plain paper
Children make equal groups of objects and find the total.

ENRICHMENT

Writing Multiplication Stories

Math Masters, p. 407
Each Orange Had 8 Slices: A Counting Book
Children write multiplication stories.

Advance Preparation

Post the Guide to Solving Number Stories from *Math Masters*, page 406. Display a multiplication/division diagram. As an option, gather multiple packages of school supplies.

For the optional Readiness activity in Part 3, obtain a copy of *Each Orange Had 8 Slices: A Counting Book* by Paul Giganti (HarperCollins Publishers, 1999).



Teacher's Reference Manual, Grades 1–3 pp. 90–94, 225–227

Getting Started

Mental Math and Reflexes

Have children count chorally. They may use number grids, number lines, or calculators as needed.

- Skip count forward and backward by 2s, 5s, and 10s.
- Skip count forward and backward by 3s.
- Skip count forward and backward by 4s.



Math Message ★



You have 4 packages of pencils. There are 6 pencils in each package. How many pencils in all? Draw a picture on a half-sheet of paper to match the number story.

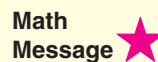
1 Teaching the Lesson

▶ Math Message Follow-Up



Ask children to share other strategies they might use to solve the number story as you make notes on the board. In addition to drawing pictures, they might suggest using counters; making arrays; counting by 1s, 4s, or 6s; adding 4s or 6s; doubling; knowing that $4 \times 5 = 20$ and $4 \times 1 = 4$ and then adding the two products (Distributive Property); or knowing that $4 \times 6 = 24$ or $6 \times 4 = 24$.

★ Ongoing Assessment: Recognizing Student Achievement



Use the **Math Message** problem to assess children's progress using strategies to compute multiplication facts. Children are making adequate progress if they are able to draw a picture to match the number story and count the total number of pencils. Some children may draw an array or use a number model.

[Operations and Computation Goal 3]

▶ Using Multiplication/Division Diagrams



(Math Masters, pp. 406 and 419)

Remind children of the diagrams (parts-and-total, change, and comparison) and unit boxes that they used in Unit 2 to solve addition and subtraction number stories. Tell children that they will now use a **multiplication/division diagram**—a set of boxes for tracking the number of groups, the numbers in each group, and the total in a number story—to solve multiplication number stories. Guide children to recall that **multiplication** finds the total number of objects in several equal groups.

Interactive whiteboard-ready ePresentations are available at www.everydaymathonline.com to help you teach the lesson.

NOTE Remind children to continue to record the sunrise, sunset, and length of day for your location on journal page 27, and the national high and low temperatures on journal page 43.

Teaching Aid Master

Name _____ Date _____ Time _____

Multiplication/Division Diagram

_____	per _____	_____ in all

Math Masters, p. 419

NOTE The unknown quantity in addition and subtraction number stories in Unit 2 was represented either by a symbol (a question mark) or a letter variable. A question mark or a letter variable may also be used in diagrams and number models to represent the unknown quantity in multiplication and division number stories.

NOTE To promote understanding of equal sharing and equal grouping, it is essential to give children opportunities to act out these situations with manipulatives. Provide a variety of manipulatives throughout the lessons in this unit.

Post the Guide to Solving Number Stories (*Math Masters*, page 406) in a prominent place. Refer to it as you guide children through the steps for solving problems.

Step 1

Ask: *What do you understand from reading the Math Message story?* Think:

- What do you want to find out? **The total number of pencils**
- What information do you know from reading the story?
There are 4 packages of pencils with 6 pencils in each.

Step 2

Ask: *What could you do to find the total number of pencils?*

multiply Explain to children that multiplication is more efficient than addition when finding the total number of objects in equal groups. For example, they should think 4×6 rather than $6 + 6 + 6 + 6$.

- Display a multiplication/division diagram. Fill in the top right box with *pencils in all*. Write a ? in the box below it to show that pencils in all is what you want to find out. Fill in the top left box with the unit *packages* and write 4 in the box below it. Then fill in the top middle box with the unit *pencils per package*. Write 6 in the box below it.

<i>packages</i>	<i>pencils per package</i>	<i>pencils in all</i>
4	6	?

Multiplication/Division diagram for Math Message number story

- Write a number model. **Possible number models: $4 \times 6 = ?$; $6 \times 4 = ?$; $? = 4 \times 6$; $? = 6 \times 4$**

Step 3

Ask: *What is the answer?* If you wish, ask children to write a complete sentence to answer the problem. **24 pencils; There are 24 pencils in all.**

Step 4

Ask: *How do you know that your answer makes sense?* Guide children as they check the reasonableness of their answers. For example, they might ask themselves, "Is the total number of pencils more than the number in one package?" **yes**

- Does your answer make the number model true? **yes** Write a summary number model on the board: $6 \times 4 = 24$

NOTE Remember that the steps in the Guide to Solving Number Stories are not necessarily sequential. Encourage children to revisit steps as needed to clarify their understanding of the problem, their plan for solving it, and their solution.

Solving Number Stories about Equal Groups

(Student Reference Book, p. 215)



Use the packages of school supplies that you have collected or refer children to the Variety Store Poster on page 215 in the *Student Reference Book*.

Display a school supply package of your choice. Then tell a story that uses **multiples of equal groups**. To support English language learners, discuss the everyday as well as the mathematical meanings of *multiple*. Emphasize the language of multiplication and equal groups. For example, use such terms as *5 packages of markers*, *6 markers in each package* (or *per package*). With the children, fill in a multiplication/division diagram for the story. Then have children find the total and share their solution strategies. Be sure to ask how they know that their answer makes sense.



Ongoing Assessment: Informing Instruction

Watch for children who write the wrong unit in their number story answers. Have them verbally restate what they are trying to find out: "I want to find out how many *balloons* are in the packages."

Suggestions from the Variety Store Poster:

- If I buy 8 packages of giant balloons, how many balloons will I have? **40 balloons**
- Shana buys 4 packages of colored markers. How many markers does she have? **20 markers** Bonus: About how much do the 4 packages cost? **About \$8.00—\$1.99 is close to \$2.00, and $4 \times \$2.00 = \8.00 .**
- If your brother buys 5 packages of notebook paper, how many pieces of paper does he buy? **1,000 pieces of paper** Bonus: About how much do the 5 packages cost? **About \$5.00—\$0.98 is close to \$1.00, and $5 \times \$1.00 = \5.00 .**



Adjusting the Activity

Pose these two-step problems:

- Renee buys 3 packages of chocolate-scented pens. Can she give one pen to each of the 20 children in her class? **No. She has only 18 pens.**
- Paige buys 2 packages of ponytail holders. Can she give 2 to each of the 15 friends at her birthday party? **No. She has only 24 ponytail holders. She would need 30.**

A U D I T O R Y ♦ K I N E S T H E T I C ♦ T A C T I L E ♦ V I S U A L

Student Page

Data Bank

Variety Store Poster

Toys	Fashion
<ul style="list-style-type: none"> • Mini stock cars 10 per box \$2.99 per box • Marbles 45 per bag \$1.45 per bag • Interlocking building blocks 395 pieces \$19.99 per set 	<ul style="list-style-type: none"> • Bright shoelaces 5 pairs per package \$2.99 per pkg. • Ponytail rings 12 per package \$1.77 per pkg. • "Hair Things" 6 per bag \$1.00 per bag
School Supplies	Party Supplies
<ul style="list-style-type: none"> • Notebook paper 200 sheets per package \$0.98 per pkg. • Value Pack pens 10 in a package \$1.27 per pkg. • Chocolate-scented pens! 6 in a pack \$1.29 per pack • "Fashion" pens 4 in a pack \$1.29 per pack 	<ul style="list-style-type: none"> • File Cards package of 100 for \$1.69 • Brilliant color markers 5-pack \$1.99 • Scented markers package of 8 for \$2.69 • Pencils 8-pack \$1.00 6-pack \$0.69
<ul style="list-style-type: none"> • Glitter Stickers 7 per pack \$1.00 per pack • 9-inch balloons 25 per bag \$1.99 per bag 	<ul style="list-style-type: none"> • Party hats 6 for \$1.49 • Party horns 8 for \$2.99 • Giant 14-inch balloons package of 5 for \$1.79

Student Reference Book, p. 215

Student Page

Date _____ Time _____

LESSON 4-1 Solving Multiplication Number Stories

Use the Variety Store Poster on page 215 of the *Student Reference Book*.

For each number story:

- ◆ Fill in a multiplication/division diagram. Write ? for the number you need to find. Write the numbers you already know.
- ◆ Write a number model.
- ◆ Use counters or draw pictures to help you find the answer.
- ◆ Record the answer with its unit. Check whether your answer makes sense.

1. Yosh has 4 boxes of mini stock cars. There are 10 stock cars in each box. How many stock cars does he have?

boxes	cars per box	cars in all
4	10	?

Number model: $4 \times 10 = ?$

Answer: 40 cars
(unit)

How do you know your answer makes sense? Sample answers: The answer has to be more than the number of cars in 1 box; the answer makes the number model true. $4 \times 10 = 40$

2. There are 100 file cards in each package. How many cards are in 5 packages of file cards?

packages	cards per package	cards in all
5	100	?

Number model: $5 \times 100 = ?$

Answer: 500 cards
(unit)

How do you know your answer makes sense? Sample answer: I know that $5 \times 1 = 5$, so 5×100 should be 500.

Math Journal 1, p. 79

Solving Multiplication Stories

(*Math Journal 1, p. 79*)



Working with partners, children solve the two multiplication stories on journal page 79. When most of the children have finished, bring them together to discuss results. Continue to help children with the language of “total number in x groups with y things per group.”

2 Ongoing Learning & Practice

Minute Math+



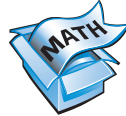
To offer children more experience with multiplication, see the following pages in *Minute Math+*:

Multiplication: pp. 43 and 48

Number Stories: pp. 79, 81, 84, and 90

Math Boxes 4-1

(*Math Journal 1, p. 80*)



Mixed Practice Math Boxes in this lesson are paired with Math Boxes in Lesson 4-3. The skill in Problem 6 previews Unit 5 content.



Writing/Reasoning Have children write or draw an answer to the following: *Draw a different polygon with the same perimeter as in Problem 4. Explain how you know that the two polygons have equal perimeters.* **Sample answer: I drew a pentagon with 5 sides. I labeled each side 4 ft, so the perimeter was 20 ft.**

Home Link 4-1

(*Math Masters, p. 85*)



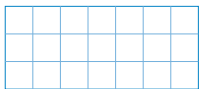
Home Connection Children use multiplication/division diagrams to solve number stories. They find and record multiples of a variety of items around their homes and make up a number story.

Student Page

Date _____ Time _____

LESSON 4-1 Math Boxes

1. Each square equals 1 sq cm. Find the area.



Area: 21 square centimeters

2. Scientists counted 136 eggs in a clutch of turtle eggs. 87 eggs did *not* hatch. Estimate how many eggs hatched.

Sample answers:

About 50 eggs

Number model for estimate:

$$140 - 90 = 50$$

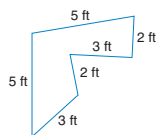
3. Make each sentence true. Use $>$, $<$, or $=$.

$$8 + 6 = 7 + 7$$

$$17 - 9 < 9 + 8$$

$$14 - 5 > 11 - 4$$

4. Find the perimeter.



Perimeter = 20 feet
(unit)

5. How many rows of dots? \dots

2 rows

How many dots in each row?

4 dots

How many dots in all? 8 dots

6. Solve.

$$45,582 - 100 = \underline{45,482}$$

$$45,582 + 100 = \underline{45,682}$$

$$45,582 + 1,000 = \underline{46,582}$$

$$45,582 - 1,000 = \underline{44,582}$$

Math Journal 1, p. 80

3 Differentiation Options

READINESS

▶ Exploring Equal Groups

(Math Masters, p. 86)

 PARTNER
ACTIVITY

 5–15 Min

To provide experience with making equal groups of objects, have children make flags that have the same number of stars. The instructions are on *Math Masters*, page 86.

ENRICHMENT

▶ Writing Multiplication Stories

(Math Masters, p. 407)

 WHOLE-CLASS
ACTIVITY

 15–30 Min



To apply children's understanding of multiplication, have children write multi-step multiplication number stories. Read the book *Each Orange Had 8 Slices: A Counting Book* to the children. After a brief discussion, children use *Math Masters*, page 407 to begin writing and illustrating their own number stories modeled after those in the book. When completed, these stories make a wonderful bulletin-board display or class book.

Teaching Master

Name _____ Date _____ Time _____

LESSON 4•1 Exploring Equal Groups

Work with a partner.

- Materials**
- 1 six-sided die
 - 1 sheet of plain paper
 - 36 counters (for example: pennies, centimeter cubes, or dried beans)
 - 6 quarter-sheets of paper

Pretend that the quarter-sheets of paper are flags.

Pretend that the pennies, cubes, or beans are stars.

1. Roll the die twice.
 - ◆ The first roll tells how many flags to use.
 - ◆ The second roll tells how many stars to put on each flag.
2. Work together to set up the flags and stars for the numbers you rolled. How many stars are there on all of the flags?
3. Use your sheet of plain paper and draw a picture.
 - ◆ Show all flags.
 - ◆ Draw dots to show all the stars on each flag.
4. Repeat Steps 1–3.

Math Masters, p. 86

Teaching Aid Master

Name _____ Date _____ Time _____

A Number Story


Unit

Math Masters, p. 407


Home Link Master

Name _____ Date _____ Time _____

HOME LINK 4•1 Multiplication Number Stories

Family Note Today your child learned about another tool to use when solving number stories, a multiplication/division diagram. It can help your child organize the information in a number story. With the information organized, your child can decide which operation (\times , \div) will solve the problem. Refer to pages 259 and 260 in the *Student Reference Book* for more information. 
Please return this Home Link to school tomorrow.

For the number story:

- ◆ Fill in a multiplication/division diagram. Write ? for the number you will find. Then write the numbers you know. 
- ◆ Write a number model.
- ◆ Use counters or draw pictures to help you find the answer.
- ◆ Write the answer and unit. Check whether your answer makes sense.

1. Elsa buys 5 packages of apples for the party. There are 6 apples in each package. How many apples does she have?

Number model: $5 \times 6 = ?$

Answer: 30 apples
(unit)

packages	apples per package	apples in all
5	6	?

How do you know your answer makes sense?

Answers vary.

2. Find equal groups of objects in your home, or around your neighborhood. Record them on the back of this page.

Examples

3 lights on each traffic light, 12 eggs per carton

3. Write a multiplication number story about one of your groups. Use the back of this paper. Solve the number story.

Math Masters, p. 85

HOME LINK
4•1

Multiplication Number Stories



Family Note Today your child learned about another tool to use when solving number stories, a multiplication/division diagram. It can help your child organize the information in a number story. With the information organized, your child can decide which operation (\times , \div) will solve the problem. Refer to pages 259 and 260 in the *Student Reference Book* for more information.

Please return this Home Link to school tomorrow.



For the number story:



- ◆ Fill in a multiplication/division diagram. Write ? for the number you will find. Then write the numbers you know.
- ◆ Write a number model.
- ◆ Use counters or draw pictures to help you find the answer.
- ◆ Write the answer and unit. Check whether your answer makes sense.

1. Elsa buys 5 packages of apples for the party. There are 6 apples in each package. How many apples does she have?

Number model: _____

Answer: _____
(unit)

packages	apples per package	apples in all

How do you know your answer makes sense?

2. Find equal groups of objects in your home, or around your neighborhood. Record them on the back of this page.

Examples

3 lights on each traffic light, 12 eggs per carton

3. Write a multiplication number story about one of your groups. Use the back of this paper. Solve the number story.