Division Ties to Multiplication

Objective To provide opportunities to model division number stories with arrays, multiplication/division diagrams, and number models.

1 Teaching the Lesson

Key Concepts and Skills
• Use multiplication facts to solve division problems.  
  [Operations and Computation Goal 3]
• Use arrays and diagrams to model equal-sharing and equal-grouping number stories.  
  [Operations and Computation Goal 6]
• Identify the quotient, dividend, divisor, and remainder.  
  [Operations and Computation Goal 6]
• Write number sentences to model number stories.  
  [Patterns, Functions, and Algebra Goal 2]

Key Activities
Children draw arrays, fill in multiplication/division diagrams, and write number models to solve division number stories.

Ongoing Assessment: Recognizing Student Achievement
Use the Math Message.  
[Operations and Computation Goal 6]

Ongoing Assessment: Informing Instruction
See page 263.

Key Vocabulary
quotient • dividend • divisor • remainder

Materials
Math Journal 1, p. 86  
Student Reference Book, p. 250 (optional)  
Home Link 4-3  
Math Masters, p. 406 (optional); pp. 407 and 419  
pennies or other counters • calculator (optional)

2 Ongoing Learning & Practice

3 Differentiation Options

Playing Division Arrays
Student Reference Book, p. 282  
per group: 1 each of number cards 6–18 (from the Everything Math Deck, if available), 18 counters, 1 six-sided die  
Children practice modeling equal sharing by making arrays.

Math Boxes 4-4
Math Journal 1, p. 87  
Children practice and maintain skills through Math Box problems.

Home Link 4-4
Math Masters, p. 92  
Children practice and maintain skills through Home Link activities.

READYNESS
Making Equal Groups on a Number Line
Math Masters, p. 93  
Children use number lines to model equal groups.

ENRICHMENT
Finding the Mystery Number
Math Masters, p. 94  
counters • calculator  
Children find mystery numbers using multiplication and division.

ELL SUPPORT
Building a Math Word Bank
Differentiation Handbook, p. 132  
Children add the term quotient to their Math Word Banks.

Advance Preparation
Post the Guide to Solving Number Stories. Make multiple copies of Math Masters, page 419 for each child to use during Part 1.

Teacher’s Reference Manual, Grades 1–3  p. 84

260 Unit 4 Multiplication and Division
Getting Started

Mental Math and Reflexes
Children count from 1 to 30, clapping at the intervals indicated below.

- Every 2nd number 1, 2 (clap); 3, 4 (clap); 5, 6 (clap); 7, 8 (clap); 9, 10 (clap); 11, 12 (clap); and so on to 30.
- Every 4th number 1, 2, 3, 4 (clap); 5, 6, 7, 8 (clap); 9, 10, 11, 12 (clap); and so on to 30.
- Every 6th number 1, 2, 3, 4, 5, 6 (clap); 7, 8, 9, 10, 11, 12 (clap); and so on to 30.

1 Teaching the Lesson

Math Message Follow-Up

Check whether any children solved the story by drawing arrays. If so, have them draw their solutions on the board. If no one used arrays, demonstrate how they can be used for division by distributing the 12 pennies into 4 rows as you count from 1 to 12. Each child gets 3 pennies.

You might also have children experiment with a calculator to find a key sequence to solve the problem. Ask partners to work together. Emphasize the question: How many pennies per child? After a few minutes, ask children to share their key sequences. 12, ÷, 4, =, 3. Point out that the ÷ symbol means divided by.

Ongoing Assessment: Recognizing Student Achievement

Use the Math Message to assess children’s progress toward using equal sharing to demonstrate the meaning of division. Children are making adequate progress if they solve the number story using pennies. Some children may be able to solve the story using other strategies (arrays, pictures, multiplication).

[Math Message]

Operations and Computation Goal 6

Home Link 4-3

Follow-Up

Have children share their strategies for solving Problem 6.
Using Number Models and Diagrams for Division Stories

(Math Masters, p. 419)

Algebraic Thinking With the 4-by-3 array from the Math Message left on the board, display a multiplication/division diagram (see below). Ask children to fill in the known numbers and identify the missing numbers in a diagram on Math Masters, page 419. The diagram is the same for division and multiplication—the diagram reinforces the inverse relationship between the two operations.

<table>
<thead>
<tr>
<th>children</th>
<th>pennies per child</th>
<th>pennies in all</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>?</td>
<td>12</td>
</tr>
</tbody>
</table>

- Ask whether a volunteer can write a number model to match the story. \(12 \div 4 = ?, \ 6 = ?, \) or \( ? = 3 \)
- Ask: How many pennies per child? 3 pennies
- Ask: Does the answer make the number model true? yes Write a summary number model for the story. \(12 \div 4 = 3\)
- The answer in each of the division number models, or the result of the division, is called the quotient.
- The dividend is the total before sharing.
- The divisor is the number of equal parts or the number in each equal part.

It is beneficial to use these words when discussing division number stories, but do not insist that children use them.

Pose the following problem: There are 15 pennies. Each child receives 4 pennies. How many children are there?

Display or draw a multiplication/division diagram on the board. Ask children to fill in the known numbers and identify the missing number.
 Pose additional problems as necessary. For each problem, fill in a multiplication/division diagram and write a number model.

- 23 candles are arranged with 3 in each row. How many rows are there? 7 rows How many candles are left over? 2 candles; $23 \div 3 = 7R2$
- 21 puppies are placed equally in 3 pens. How many puppies are there per pen? 7 puppies How many puppies are left over? none; $21 \div 3 = 7$
- 18 cards are dealt so that each player gets 4 cards. How many players are there? 4 players How many players are left over? 2 players; $18 \div 4 = 4 \div 2$
- 17 markers are shared equally among 6 children. How many markers does each child get? 2 markers How many markers are left over? 5 markers; $17 \div 6 = 2R5$
- A piece of cloth 15 yards long is cut into smaller pieces for dresses. Each dress needs 2 yards. How many dresses can be made? 7 dresses How many yards of cloth are left over? 1 yard; $15 \div 2 = 7 \div 2 = 7R1$
Solving Multiplication and Division Number Stories
(Math Journal 1, p. 86; Math Masters, pp. 406 and 407; Student Reference Book, p. 250)

Algebraic Thinking  Refer children to the Guide to Solving Number Stories. Partners or small groups work cooperatively to solve each story on journal page 86. Encourage children to write their own division number stories on Math Masters, page 407. Have partners use the inverse relationship between multiplication and division to check their answers.

Playing Division Arrays
(Student Reference Book, p. 282)

Children practice modeling equal sharing by making arrays in Division Arrays. For detailed instructions, see page 282 in the Student Reference Book.

Math Boxes 4-4
(Math Journal 1, p. 87)

Mixed Practice  Math Boxes in this lesson are paired with Math Boxes in Lesson 4-2. The skill in Problem 6 previews Unit 5 content.

Home Link 4-4
(Math Masters, p. 92)

Home Connection  Children use division to solve number stories.
### Differentiation Options

**READINESS**

#### Making Equal Groups on a Number Line

*(Math Masters, p. 93)*

To provide experience with equal-grouping situations using a number-line model, have children solve equal-grouping problems by marking and counting hops on a number line.

**ENRICHMENT**

#### Finding the Mystery Number

*(Math Masters, p. 94)*

To apply children’s understanding of the relationship between multiplication and division, have them find mystery numbers and identify patterns on *Math Masters*, page 94. When children have finished the page, have them share their ideas on why the Mystery Number is the same as the first number. Sample answer: First you multiply a number, then you subtract that number one time and divide by one less than you multiplied by.

#### Building a Math Word Bank

*(Differentiation Handbook, p. 132)*

To provide language support for division, have children use the Word Bank template found on *Differentiation Handbook*, page 132. Ask children to write *quotient* and *remainder*, draw a picture representing each word, and write other related words. See the *Differentiation Handbook* for more information.