Multiplication and Division Fact Families

**Objectives** To review fact families and the Multiplication/Division Facts Table; and to guide children as they practice multiplication and division facts.

**Key Concepts and Skills**
- Use Fact Triangles and the Facts Table to generate multiplication and division fact families.  
  [Operations and Computation Goal 3]
- Look for patterns on the Facts Table.  
  [Patterns, Functions, and Algebra Goal 1]
- Explore the inverse relationship between multiplication and division fact families.  
  [Patterns, Functions, and Algebra Goal 2]
- Apply the turn-around rule (Commutative Property of Multiplication).  
  [Patterns, Functions, and Algebra Goal 4]

**Key Activities**
Children use the Multiplication/Division Facts Table and Fact Triangles to find fact families and to practice multiplication and division facts.

**Ongoing Assessment:** Recognizing Student Achievement
Use the Math Message.  
[Patterns, Functions, and Algebra Goal 2]

**Key Vocabulary**
Multiplication/Division Facts Table

**Materials**
- Math Journal 1, inside front cover
- Math Journal 1, Activity Sheets 1 and 2; Activity Sheets 3 and 4 (optional)
- Student Reference Book, pp. 52 and 53
- Home Link 4-5
- Math Masters, p. 98 (optional); p. 421
- transparencies of Math Masters, pp. 98 and 421 (optional)
- scissors ✦ slate ✦ paper ✦ envelope ✦ half-sheet of paper

**Advance Preparation**
When you send Home Link 4-6 home, copy and attach Math Masters, pages 101 and 102.

**Teacher’s Reference Manual, Grades 1–3** pp. 16, 17

**Practicing with ×, ÷ Fact Triangles**
- ×, ÷ Fact Triangles
  Children practice multiplication and division with Fact Triangles.

**Math Boxes 4-6**
- Math Journal 1, p. 90
  Children practice and maintain skills through Math Box problems.

**Home Link 4-6**
- Math Masters, pp. 99–102
  Children practice and maintain skills through Home Link activities.

**READINESS**
Practicing Multiplication Facts with a Calculator
- Math Masters, p. 103
  calculator
  Children skip count with calculators.

**ENRICHMENT**
Examining a Pattern
- Math Masters, p. 98 or Math Journal 1, inside front cover
  per partnership: half-sheet of paper, highlighters (optional)
  Children examine a pattern in the Multiplication/Division Facts Table.
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 and 6s.
- ○○○ Skip count forward and backward by 4s and 8s.

Math Message ★
Write the +, − fact family for the numbers 2, 2, and 4 on a half-sheet of paper.

Home Link 4-5 Follow-Up
Have partners discuss the multiplication-fact shortcuts they like the best.

1 Teaching the Lesson

Math Message Follow-Up
Ask a volunteer to share the fact family for 2, 2, and 4. 2 + 2 = 4, and 4 − 2 = 2. The fact family 2, 2, and 4 is a doubles fact family. Mention that just like addition and subtraction fact families, there are also multiplication and division fact families.

Ongoing Assessment: Recognizing Student Achievement
Use the Math Message to assess children’s progress toward using the +, −, and = symbols. Children are making adequate progress if they are able to write the fact family. Some children may notice that the same numbers (2, 2, and 4) can be used to write a multiplication fact and a division fact using the ×, ÷, and = symbols.

Introducing Multiplication/Division Fact Families
(Math Masters, p. 421)

Use a transparency of a blank Fact Triangle (Math Masters, page 421) or draw one on the board.

Write the three numbers from a multiplication fact—for example, 3, 4, and 12—in the corners of the triangle. Be sure the product is at the top under the large dot.

Ask volunteers to name the fact family (the two multiplication facts and two division facts) for those numbers. 3 × 4 = 12, 4 × 3 = 12, 12 ÷ 3 = 4, and 12 ÷ 4 = 3
Write a few more triplets of numbers in the triangle. Children write the fact families on their slates. A volunteer reads the results as the others check their slates.

In the previous lesson, children used arrays to demonstrate a turn-around rule for multiplication. Ask: *Is there a turn-around rule for the division facts in each fact family?* No Have children give examples to show that there is no turn-around rule for division; for example, 6 divided by 3 gives a different answer than 3 divided by 6. Some children may recognize that division problems, such as $3 \div 6$, can be thought of as fractions: $3 \div 6$ is equivalent to $\frac{3}{6}$ or $\frac{1}{2}$.

#### Finding Patterns in the Facts Table

*(Math Journal 1, inside front cover; Math Masters, p. 98)*

**Algebraic Thinking** Ask children to study the *Multiplication/Division Facts Table* on the inside front cover of the journal. You may also display a transparency of the table (*Math Masters*, page 98). Give children a few minutes to examine the table. Have them describe patterns they find. **Examples:**

- Going across the second row and down the second column, the numbers increase by 1. In the third row and third column, the numbers increase by 2, and so on.
- In the 10-column and the 10-row, all of the numbers end in 0.
- In the 5-column and the 5-row, all of the numbers end in 0 or 5.
- In the 2-column and the 2-row, all of the numbers end in an even number.
- In the diagonal, moving from upper left to lower right, the numbers increase by 3, 5, 7, 9, and so on.

#### Using the Facts Table and Fact Families

*(Student Reference Book, pp. 52 and 53)*

Model how to use the table to find products.

**Example:** $5 \times 7 = ?$ and $7 \times 5 = ?$

- Find the 5-row. Go across the 5-row to the 7-column. That number is 35. This shows that $5 \times 7 = 35$.
- Find the 7-row. Go across the 7-row to the 5-column. That number is 35. This shows that $7 \times 5 = 35$.

Have children practice other multiplication examples, including $8 \times 1 = ?$ and $1 \times 4 = ?$. Use the *Multiplication/Division Facts Table* to highlight the special property of 1 in multiplication. If a number is multiplied by 1, the number is not changed. $8 \times 1 = 8$; $1 \times 4 = 4$. 
Next, demonstrate how to use the Multiplication/Division Facts Table to find quotients.

Example: $28 \div 4 = ?$

- Find the 4-row. Go across the 4-row until you find 28. Go up that column to the heading, which is 7. This also shows that $28 \div 4 = 7$.
- Find the 4-column. Go down the column until you find 28. Go across the row to the heading, which is 7. This also shows that $28 \div 4 = 7$.

Have children practice other division examples including $6 \div 1 = ?$ and $7 \div 7 = ?$. Use the Multiplication/Division Facts Table to highlight the special property of 1 in division. If a number is divided by 1, the number is not changed. If a number is divided by itself, the result is 1. For example, $6 \div 1 = 6$ and $7 \div 7 = 1$.

Call out multiplication facts. Ask children to highlight the facts with a sheet of paper as shown in the margin. Then children state the corresponding division facts. Alternately, children highlight division facts on the table as you call them out. They then state the corresponding multiplication facts.

**Practicing with Fact Triangles**

*(Math Journal 1, Activity Sheets 1 and 2)*

Have children cut out the Multiplication/Division Fact Triangles from Activity Sheets 1 and 2 at the back of their journals.

Review the procedure for practicing the facts with Fact Triangles. While one child covers a number on a Fact Triangle, the partner tells the multiplication or division fact for the exposed numbers.

**NOTE** Have children store their Fact Triangles in their tool kits in envelopes. Some teachers have children write the fact families on the backs of the Fact Triangles. This should be an ongoing project, done a few at a time.
**2. Ongoing Learning & Practice**

- **Practicing with ×, ÷ Fact Triangles**

  Have partners use their Fact Triangles to practice basic multiplication and division facts. At first, children should limit themselves to finding products. That is, one partner covers the number below the large dot, and the other gives the product of the uncovered factors. When children are well on their way to learning products, they can cover one of the other two numbers to practice finding missing factors.

- **Math Boxes 4-6**

  *(Math Journal 1, p. 90)*

  **Mixed Practice** Math Boxes in this lesson are paired with Math Boxes in Lesson 4-9. The skill in Problem 6 previews Unit 5 content.

  **Writing/Reasoning** Have children answer the following question: *When a number is multiplied by 1, the number does not change. What can you say about dividing a number by 1? Sample answer: When a number is divided by 1, the number does not change.*

- **Home Link 4-6**

  *(Math Masters, pp. 99–102)*

  **Home Connection** Children review multiplication and division fact families. Send home copies of *Math Masters*, pages 101 and 102, which contain Fact Triangles.

**3. Differentiation Options**

- **Practicing Multiplication Facts with a Calculator**

  *(Math Masters, p. 103)*

  To provide experience skip counting on a calculator, have children use their calculators to complete the tables on *Math Masters*, page 103. Review the steps for counting by 1s on the calculator. Children can program the calculator using the following steps:
Lesson 4-6

Math Masters, p. 103

**Examining a Pattern**

(Math Masters, p. 98; or Math Journal 1, inside front cover)

To further explore the Multiplication/Division Facts Table, have children examine a pattern in the table. Together, they circle a number on the table. Then, they circle the number in the square above, to the right, below, and to the left of the chosen number. Next, they add the starting number plus the four circled numbers.

Children record their starting number and the sum of the five circled numbers on a half-sheet of paper as shown. They repeat this several times and look for a pattern in the recorded numbers. The product of the starting number and 5 is always equal to the sum of the five numbers. Ask: How does this pattern work? Sample answer for the example: “I made the 6s into 4s and added the leftovers to the 2s to make them into 4s. So I had five 4s.”