### Objective
To provide opportunities to review and solve “What’s My Rule?” problems.

### Key Concepts and Skills
- Use basic facts to compute extended facts.  
  [Operations and Computation Goal 1]
- Describe rules for patterns and use them to solve problems.  
  [Patterns, Functions, and Algebra Goal 1]
- Describe rules and patterns in “What’s My Rule?” tables; use them to solve addition and subtraction problems.  
  [Patterns, Functions, and Algebra Goal 1]

### Key Activities
Children discuss problems in which one quantity depends on another. They illustrate this kind of relationship between pairs of numbers with a function machine and “What’s My Rule?” tables. They solve “What’s My Rule?” problems.

**Ongoing Assessment: Informing Instruction**  See page 114.

**Ongoing Assessment: Recognizing Student Achievement**  Use journal page 34.  
[Patterns, Functions, and Algebra Goal 1]

### Key Vocabulary
function machine ◆ input ◆ rule ◆ output ◆ “What's My Rule?”

### Materials
- Math Journal 1, p. 34
- Home Link 2-3
- transparency of Math Masters, p. 41  (optional)

### Advance Preparation
- Teacher’s Reference Manual, Grades 1–3  pp. 18, 19, 209–215

### Playing Fact Games
- Student Reference Book, pp. 278 or 310 and 311
- Beat the Calculator
  per group: 4 each of number cards 0–9 (from the Everything Math Deck, if available), calculator
- Subtraction Top-It
  per group: 4 each of number cards 0–10 and 1 each of number cards 11–20 (from the Everything Math Deck, if available)
- Children maintain and/or practice basic fact fluency.

### Math Boxes 2-3
- Math Journal 1, p. 35
- Children practice and maintain skills through Math Box problems.

### Home Link 2-3
- Math Masters, p. 42
- Children practice and maintain skills through Home Link activities.

### Differentiation Options
- **READINESS**
  - Acting Out a Function Machine
    - cardboard box ◆ counters
    - Children act out a function machine.
  - Creating “What’s My Rule?” Tables
    - Math Masters, p. 41
    - Children work together to make up their own “What’s My Rule?” tables.

- **ENRICHMENT**
  - Children maintain and/or practice basic fact fluency.

- **Teaching the Lesson**
- **Ongoing Learning & Practice**
- **Differentiation Options**
Teaching the Lesson

Math Message Follow-Up

Algebraic Thinking Draw or display a function machine and “What’s My Rule?” table. Ask children to imagine that the function machine works like this:

- A number (the input) is dropped into the machine.
- The machine changes the number according to a rule.
- A new number (the output) comes out the other end.

The rule for the Math Message problem is Double the number. Write the word Double in the function machine. Point out the “What’s My Rule?” table that you have displayed. Discuss the 8 in the in column and the 16 in the out column. Explain to children that numbers in the in column represent the number of bacteria now. Corresponding numbers in the out column represent the number of bacteria 20 minutes from now.

Review the answers to the Math Message problem by posing questions in the following manner:

- If 50 is dropped into the function machine, which number will come out? 100 Enter the appropriate numbers in the in and out columns. Repeat with the other numbers in the problem.
Reviewing Variations of the “What’s My Rule?” Routine

(Math Masters, p. 41)

Algebraic Thinking If you made a transparency of Math Masters, page 41, you can demonstrate each type of “What’s My Rule?” table on the overhead. Otherwise, draw the tables on the board. In the Math Message problem, the rule and sample inputs are known, and the outputs must be determined. (See Type 1 in the margin.)

- In a second type of “What’s My Rule?” problem, the rule and sample outputs are known, but the inputs must be determined. (See Type 2 in the margin.)
- In a third type of “What’s My Rule?” problem, the inputs and outputs are known, and the rule must be determined. (See Type 3 in the margin.)
- In a fourth type of “What’s My Rule?” problem, some inputs and outputs are known; missing numbers and the rule must be determined. (See Type 4 in the margin.) To find the rule in problems like these, children should use the pairs in which both in and out numbers are given. Then, after the rule is discovered, children can use the rule to fill in the missing in and out numbers. Pose problems like the fourth type to the class.
- In a fifth type of “What’s My Rule?” problem, rules are often stated as simple commands to perform a specific operation, such as Add 5. However, rules may also be stated in a context—“Mark is 4 years younger than his sister, Susie” or as in the Math Message—“Some bacteria double in number every 20 minutes.” (See Type 5 in the margin.) Encourage children to supply both types of rules.

Completing “What’s My Rule?” Tables

(Math Journal 1, p. 34; Math Masters, p. 41)

Algebraic Thinking Children may work in partnerships or independently to complete the journal page. Note that the last row in each table is left blank. Encourage children to create difficult problems. Math Masters, page 41 may be used to provide additional practice with “What’s My Rule?” tables.

Ongoing Assessment: Informing Instruction

Watch for children who have difficulty finding the missing in numbers. Have them check their work by reading the number sentence formed by the in number, the rule, and the out number.
Ongoing Learning & Practice

Playing Fact Games
(Student Reference Book, pp. 278 or 310 and 311)

Have children play either Beat the Calculator (Addition) or Subtraction Top-It to maintain and/or practice basic fact fluency. Review the rules for these two games in the Student Reference Book (page 278 for Beat the Calculator and pages 310 and 311 for Subtraction Top-It).

Continue to provide children with opportunities to play fact games regularly.

Math Boxes 2·3
(Math Journal 1, p. 35)

Mixed Practice Math Boxes in this lesson are paired with Math Boxes in Lesson 2-1. The skill in Problem 6 previews Unit 3 content.

Writing/Reasoning Have children write an answer to the following: Explain your strategy for Problem 4. Sample answer: I counted up $0.12 from $7.88 to get to $8.00. From $8.00 to $10.00 is $2.00. The change is $2.00 + $0.12 or $2.12.

Home Link 2·3
(Math Masters, p. 42)

Home Connection Children practice facts and fact extensions in the “What’s My Rule?” format. “What’s My Rule?” may not be familiar to parents, so you might want to send home the Student Reference Book.

Ongoing Assessment: Recognizing Student Achievement
Use journal page 34, Problems 1 and 2, to assess children’s ability to write and use rules for functions involving addition and subtraction. Children are making adequate progress if they are able to complete Problems 1 and 2. Some children may be able to complete the remaining problems involving missing rules and numbers.

[Patterns, Functions, and Algebra Goal 1]
3 Differentiation Options

READINESS

Acting Out a Function Machine

Algebraic Thinking To explore function machines using a concrete model, use a cardboard box without a lid to demonstrate how a function machine works.

Draw a picture of an *Everyday Mathematics* function machine on one side of the box. Place 15 counters inside the box. To begin the demonstration, put 3 counters into the machine. Take 6 counters out of the machine. Repeat with additional numbers of counters (4 and 8, 5 and 10). Then ask children how the machine is changing the number of counters each time. Children should try to state the rule the machine is using. (In the example, the machine doubles the number.) Repeat with other rules (for example, +4, –2). As children understand the process, have them serve as the rule makers.

ENRICHMENT

Creating “What’s My Rule?” Tables

("Math Masters, p. 41")

To provide further exploration of “What’s My Rule?” problems, have children create their own “What’s My Rule?” tables. Encourage them to use negative numbers, larger numbers, or rules stated in a context (such as Type 5 in the margin on page 114.) To support English language learners, have children read their rules. Consider having them state their rules in different ways. For example, “My rule is to add 2. Plus 2 is another way to say my rule.”