**Grade 3**

# Minnie's Diner

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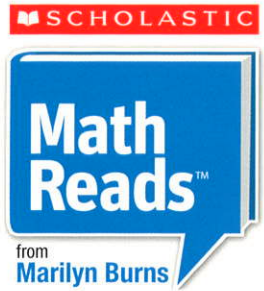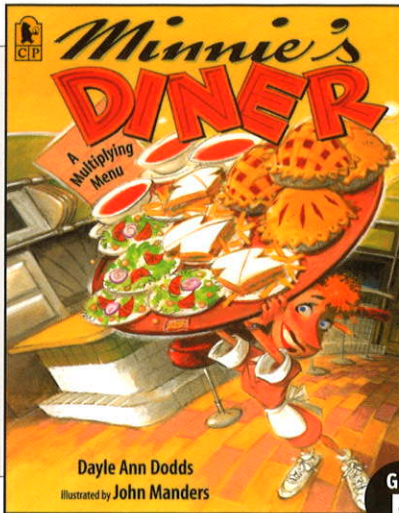
| TOPICS | |
|--------|--------|
| Multiplication | Patterns |

As the McFay boys begin their chores, the smells from Minnie's Diner lure them. First, little Will appears at the diner and orders the special. Not far behind, his brother Bill, twice as big, orders a double special. Soon brothers Phil, Gill, and Dill arrive, each twice as big as the brother before, and the orders double and double. Papa notices his missing sons and follows the smells to Minnie's. The book uses humorous poetry to introduce students to the concept of doubling.

**GRL N**

### Standards for Mathematical Practice

- Reason abstractly and quantitatively.
- Look for and make sense of structure.
- Look for and express regularity in repeated reasoning.

### Standards for Mathematical Content

- Operations & Algebraic Thinking

### Objectives

- Use multiplication within 100 to solve problems.
- Identify arithmetic patterns.

## Getting Started

Show the cover and read the title and subtitle aloud. Ask students to share ideas about what they think "A Multiplying Menu" might be. Read the book and then use the following lesson ideas in the order they appear.

## LESSON IDEAS

### 👥 Connect Doubling to Multiplying by 2

- On the board, draw a chart with three columns as shown below.

| Doubling | Drawing | Multiplying by 2 |
|----------|---------|------------------|
| 1 + 1 = 2 | | |
| 2 + 2 = 4 | | |

- After you write the first two equations, have the students tell you the equations that come next. (4 + 4 = 8, 8 + 8 = 16, 16 + 16 = 32, and 32 + 32 = 64)

- In the second column, next to 1 + 1 = 2, draw two circles with one star in each. Explain how the equation with addition and the picture are related. Continue for each equation, drawing two circles and the correct number of stars in each. Complete the third column. Write in the first row: **2 × 1 = 2**. Read the equation two ways: *2 times 1 equals 2. Two groups of 1 star equals 2 stars.*

- Complete the chart. Explain to the students that doubling by adding and by multiplying by two give the same result.

**CONTINUE ▶**

## 👫 Solve a Problem

- Have students look at the pages where Minnie is serving Will his meal. Using the illustration, point out that Minnie used five dishes. Have the students count with you, and point out that the soup required two dishes.

- Remind students that Bill's meal was double Will's. Ask: *How many dishes did Minnie use for Bill's meal?* (10) *How many dishes did Minnie use to serve both Will and Bill?* (15) Ask students to explain their thinking.

- Present a problem for students to solve in pairs. Ask: *What equation can you write to figure out how many dishes Minnie used to feed all five boys?* (5 + 10 + 20 + 40 + 80 = 155)

- Ask students to record their solutions and strategies on a piece of paper and have them refer to it when they share their work with the class.

## 🧍 Write Equations With Addition and Multiplication

- Give each student a piece of paper to record equations as you pose problems. Say: *When Pa arrived, he ordered a double of Dill's meal. Using addition and multiplication, what equations can you write to figure out how many meals Pa ordered?* (16 + 16 = 32 and 2 × 16 = 32)

- Ask: *What two equations can you write to figure out how many dishes Minnie will need for Pa's meal?* (80 + 80 = 160 and 5 × 32 = 160)

- Have students write an equation with addition to figure out how many dishes Minnie used to serve all the meals so far. After students share their thinking, write on the board: **5 + 10 + 20 + 40 + 80 + 160 = 315**.

- For an additional challenge, tell students that Ma arrives looking for her family and orders a double of Pa's meal. Say: *Write an equation with multiplication and an equation with addition to figure out how many meals Ma ordered.* (32 + 32 = 64 and 2 × 32 = 64 meals) Have students write equations to figure out how many dishes Minnie needed for Ma's meal. (160 + 160 = 320 and 2 × 160 = 320 dishes)

## 👫👫 Introduce Powers of 2

- Say: *We've been using equations with multiplication and addition to double numbers. Now we're going to investigate another way to represent numbers that result from doubling.* Ask for student input as you write on the board:

$$2 = 2$$
$$4 = 2 \times 2$$
$$8 = 2 \times 2 \times 2$$
$$16 = 2 \times 2 \times 2 \times 2$$
$$32 = 2 \times 2 \times 2 \times 2 \times 2$$
$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

- Introduce the terminology and the use of exponents. Say: *The numbers 2, 4, 8, 16, and so on, are called powers of 2.* Show the notation for exponents and explain that the exponent tells how many times to use 2 as a factor. Add the notation to the list of equations on the board.

- As a challenge, ask students to continue the chart up to 1024.

### SUPPORTING INSTRUCTION

To further challenge students, pose the following problem: *Suppose you double beginning with the number 5. What numbers would you get? What patterns do you notice?* (This is the same pattern as the number of dishes—5, 10, 20, 40, 80, 160, . . .)

### Vocabulary

**Math Vocabulary**

| ENGLISH | SPANISH* |
|---|---|
| add | *sumar* |
| double | *doble* |
| exponent | *exponente* |
| factor | *factor* |
| multiply | *multiplicar* |
| twice | *dos veces* |

**Context Vocabulary**

| ENGLISH | SPANISH* |
|---|---|
| diner | *cafetería* |
| plateau | *meseta* |

### 🏠 HOME CONNECTION

Ask students to count the number of dishes their family uses for a meal. Then ask them to figure out the number needed if everyone in their family had a double dinner.

*Pointing out Spanish cognates will help students make meaning-based connections.*

**SCHOLASTIC**