Unit 3, Lesson 3

Patterns in Multiplication

Let's look at patterns in multiplication of a fraction by a whole number.

Activity 1

Describe the Pattern

1. Here are two tables with expressions. Find the value of each expression. Use a diagram if you find it helpful.

   Leave the last two rows of each table blank for now.

Set A

expression	value
$1 \times \frac{1}{8}$	
$2 \times \frac{1}{8}$	
$3 \times \frac{1}{8}$	
$4 \times \frac{1}{8}$	
$5 \times \frac{1}{8}$	
$6 \times \frac{1}{8}$	

Set B

expression	value
$2 \times \frac{1}{3}$	
$2 \times \frac{1}{4}$	
$2 \times \frac{1}{5}$	
$2 \times \frac{1}{6}$	
$2 \times \frac{1}{7}$	
$2 \times \frac{1}{8}$	

2. Look at your completed tables. What patterns do you see in how the expressions and the values are related?

3. In the last two rows of the table of Set A, write $\frac{11}{8}$ in one row and $\frac{13}{8}$ in the other, in the "value" column. Write the expressions with those values.

4. In the last two rows of the table of Set B, write $\frac{2}{12}$ in one row and $\frac{2}{15}$ in the other, in the "value" column. Write the expressions with those values.

Activity 2

What's Missing?

1. Use the patterns you observed earlier to complete each equation so that it's true.

   a. $5 \times \frac{1}{10} = _____$

   b. $8 \times \frac{1}{6} = _____$

   c. $4 \times _____ = \frac{4}{5}$

   d. $6 \times _____ = \frac{6}{10}$

   e. $_____ \times \frac{1}{4} = \frac{3}{4}$

   f. $_____ \times \frac{1}{12} = \frac{7}{12}$

2. Your teacher will give you a sheet of paper. Work with your group to complete these steps on the paper. After each step, pass your paper to your right.
   - Step 1: Write a fraction with a numerator other than 1 and a denominator no greater than 12.
   - Step 2: Write the fraction you received as a product of a whole number and a unit fraction.
   - Step 3: Draw a diagram to represent the equation you just received.
   - Step 4: Collect your original paper. If you think the work is correct, explain why the expression and the diagram both represent the fraction that you wrote. If not, discuss what revisions are needed.