Unit 3, Lesson 6

Problems with Equal Groups of Fractions

Let's solve problems with fractions.

Warm-up

True or False: Two and Three Factors

Decide whether each statement is true or false. Be prepared to explain your reasoning.

- $\frac{10}{12} = 5 \times \frac{2}{12}$

- $1 \times \frac{10}{12} = 5 \times \frac{2}{12}$

- $\frac{24}{4} = 6 \times 3 \times \frac{1}{4}$

- $12 \times 2 \times \frac{1}{4} = 8 \times 3 \times \frac{1}{4}$

Activity 1

Banana Bread Recipe

A bakery makes banana bread. Here is the list of ingredients for 1 batch:

Ingredients:

- 1 banana
- $\frac{2}{3}$ cup butter
- $\frac{3}{2}$ teaspoons baking soda
- $\frac{5}{8}$ cup sugar
- 2 large eggs
- $\frac{5}{2}$ cups all-purpose flour

1. The bakery makes 2 batches of banana bread on Monday. Complete the table to show how much of each ingredient is used.

Monday's banana bread

ingredient	expression	amount of ingredient
bananas		_____
butter		_____ cup(s)
baking soda		_____ teaspoon(s)
sugar		_____ cup(s)
eggs		_____
flour		_____ cup(s)

2. On Tuesday, the bakery needs $\frac{8}{3}$ cups of butter to make enough banana bread for the day. How many batches are made on Tuesday? Explain or show your reasoning.

Recipe:

- 1 banana
- $\frac{2}{3}$ cup butter
- $\frac{3}{2}$ teaspoons baking soda
- $\frac{5}{8}$ cup sugar
- 2 large eggs
- $\frac{5}{2}$ cups all-purpose flour

3. Based on the number of the batches made on Tuesday, complete the table for each ingredient.

Tuesday's banana bread

ingredient	expression	amount of ingredient
bananas		_____
butter		$\frac{8}{3}$ cups
baking soda		_____ teaspoon(s)
sugar		_____ cup(s)
eggs		_____
flour		_____ cup(s)

Activity 2

How Much Milk Was Used?

The bakery that sells banana bread also sells fresh milkshakes. Each milkshake uses $\frac{1}{10}$ gallon of milk.

Here are 5 descriptions of the milkshakes sold in a week and 5 expressions that represent the gallons of milk used.

Match each description to an expression that represents it.

1. On Monday, the bakery sold 8 milkshakes. How much milk was used?
2. On Tuesday, 2 customers bought 4 milkshakes each. How much milk was used?
3. On Wednesday, 4 customers bought 2 milkshakes each. How much milk was used?
4. On Thursday, 2 customers each bought a milkshake. They placed the same order 3 more times for their friends that day. How much milk was used?
5. On Saturday, 4 friends each bought a milkshake for breakfast. They placed the same order after dinner. How much milk was used?

$4 \times (2 \times \frac{1}{10})$

$4 \times \frac{2}{10}$

$8 \times \frac{1}{10}$

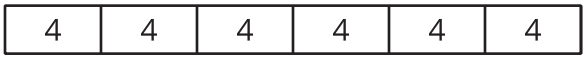
$2 \times (4 \times \frac{1}{10})$

$2 \times \frac{4}{10}$

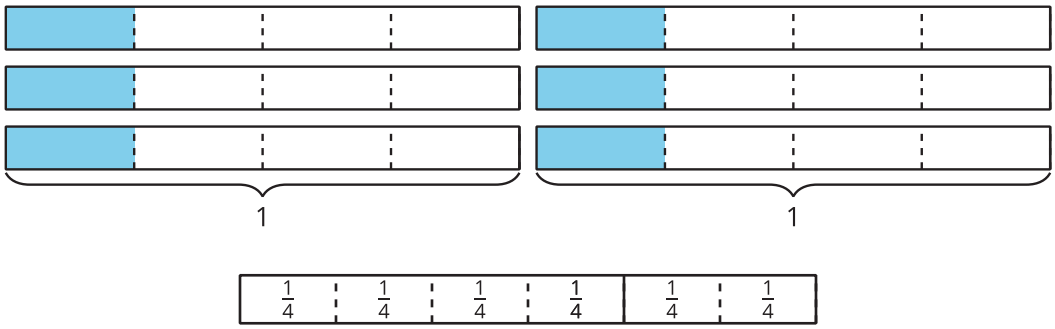
Section A Summary

We learned to multiply a whole number and a fraction by thinking about equal-size groups, just as we did when multiplying two whole numbers.

We can think of 6×4 as 6 groups of 4. A diagram like this can help to show that the product is 24:



We also can think of $6 \times \frac{1}{4}$ as 6 groups of $\frac{1}{4}$. Diagrams can help us see that the product is $\frac{6}{4}$:



After looking at patterns closely, we noticed that when we multiply a whole number and a fraction, the whole number is multiplied only by the numerator of the fraction and the denominator stays the same.

Example:

$$6 \times \frac{1}{2} = \frac{6}{2}$$

$$2 \times \frac{4}{5} = \frac{8}{5}$$

We also learned that:

- Every fraction can be written as the multiplication of a whole number and a unit fraction. For example, $\frac{5}{4}$ can be written as $5 \times \frac{1}{4}$.
- We can write different multiplication expressions for the same fraction. For example, $\frac{8}{3}$ can be written as:

$8 \times \frac{1}{3}$ $\quad$ $4 \times 2 \times \frac{1}{3}$ $\quad$ $4 \times \frac{2}{3}$ $\quad$ $2 \times \frac{4}{3}$