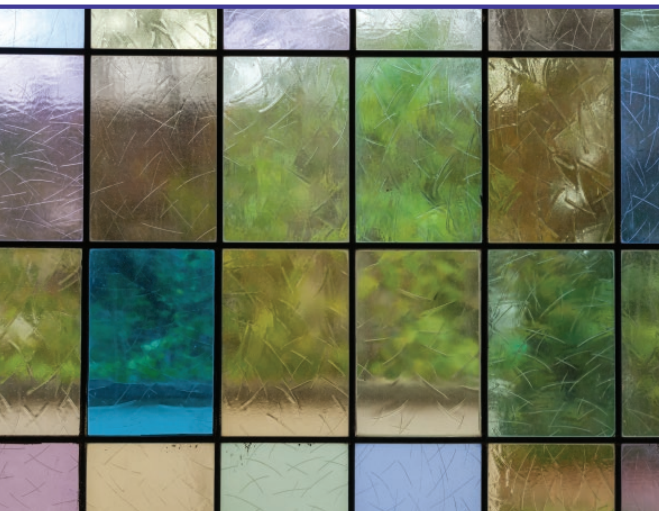


Name: \_\_\_\_\_

## Lesson 9

## Using Area Models to Multiply Fractions



## My Learning Goals

I can interpret the meaning of multiplying with fractions.

I can explain the sequence of operations when multiplying with fractions.

I can represent fraction products as rectangular areas.

**Activate** Selling More Pizzas

- Read the story. Then, answer the question. Sketch a model and write an equation to explain your reasoning.

The fifth-graders are making rectangular pizzas to sell at home basketball games. One pizza costs \$24, but customers can buy part of the pizza.

- 1 Zoe bought  $\frac{2}{3}$  of  $\frac{3}{4}$  of a pizza. How much pizza did Zoe buy? How much did she pay?

### Explore Using an Area Model with Fractions

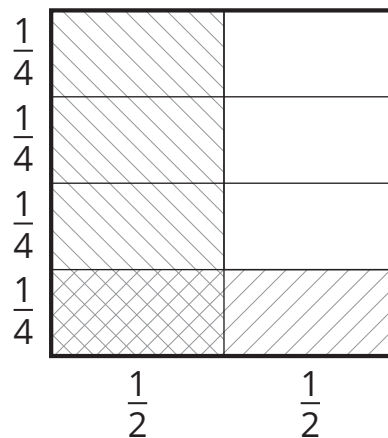
When you multiply a fraction by a fraction, you are calculating a part of a part. You can represent the product of two fractions using an area model.

#### Worked Example

Consider an area model for  $\frac{1}{4} \times \frac{1}{2}$  and what it represents.

To represent  $\frac{1}{4}$ , partition the square into 4 equal parts along the vertical line. Then, shade  $\frac{1}{4}$ .

To represent  $\frac{1}{2}$ , partition the square along the horizontal into 2 equal parts along the horizontal line. Then, shade  $\frac{1}{2}$ .

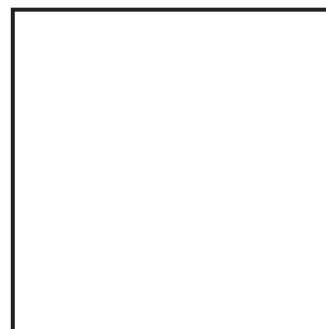


$$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

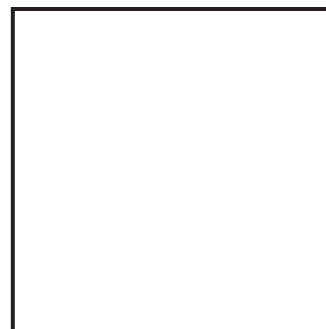
The area of the overlapping region is the product of the fractions.

➤ Represent each product using an area model.  
Then, calculate the product.

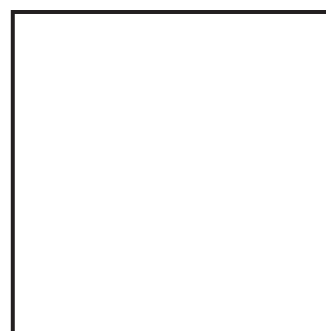
1  $\frac{3}{4} \times \frac{1}{2}$



2  $\frac{2}{3} \times \frac{3}{4}$



3  $\frac{1}{2} \times \frac{2}{3}$



➤ Review the products calculated in Questions 1 through 3.

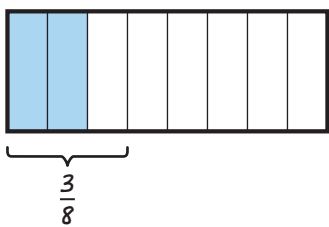
4 Write a rule to calculate the product of 2 fractions.

**Explore** Multiple Representations

➤ Analyze the strategies. Then, answer each question.



Lachlan



$$\frac{2}{3} \times \frac{3}{8} = \frac{2}{8}$$

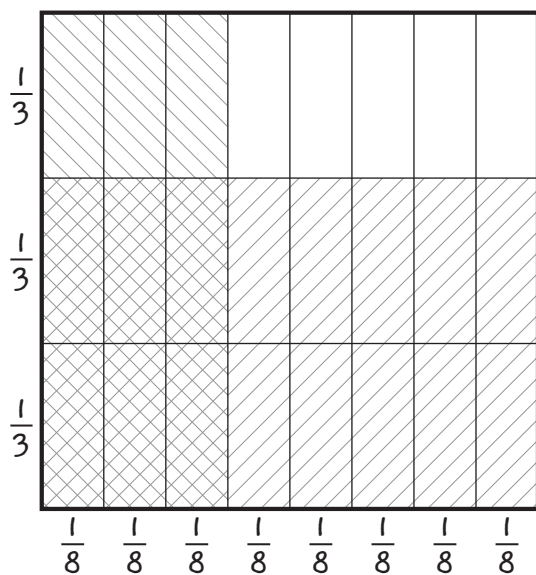


Aaliyah

$$\frac{2}{3} \times \frac{3}{8} = \frac{2 \times 3}{3 \times 8} = \frac{6}{24}$$



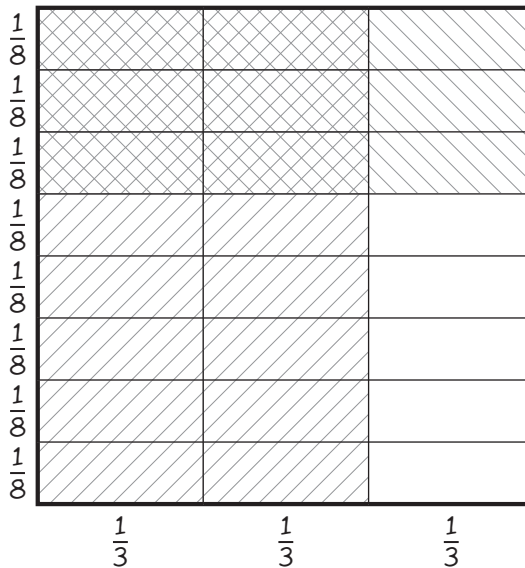
Camila



$$\frac{2}{3} \times \frac{3}{8} = \frac{6}{24}$$



Henry



$$\frac{2}{3} \times \frac{3}{8} = \frac{6}{24}$$

1 How are the methods alike?

2 How are the methods different?

3 Which method do you prefer? Why?



4 Carlos noticed that when he multiplies 2 fractions less than 1, the product is less than each of the 2 fractions he multiplied. Owen didn't think Carlos's products were correct because he learned that when multiplying, the product is greater than the factors. Who is correct? Explain your reasoning.

**Reflect** Area Model Multiplication

➤ Read the story. Then, answer each question.

Charlotte is using an area model to multiply  $\frac{3}{4}$  and  $\frac{1}{2}$ .

1 How can Charlotte partition a square to represent the problem?



2 How can you use an area model to represent the product? Explain your reasoning.



3 What is the product of  $\frac{3}{4}$  and  $\frac{1}{2}$ ? Explain your reasoning.



➤ Choose the problem that feels just right for you and fill in the star.