Understand Fraction Multiplication
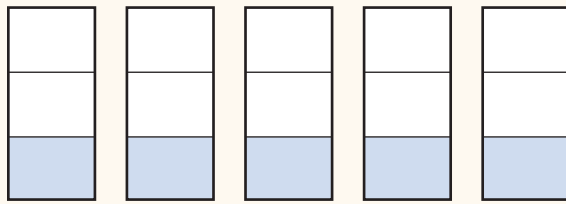
Dear Family,

This week your child is exploring fraction multiplication.

Multiplying fractions is finding the total number of equal-sized parts in equal groups.

Your child can use a model to understand fraction multiplication.

This model shows $5 \times \frac{1}{3}$.

You can see that there are 5 groups of $\frac{1}{3}$.

There are $\frac{5}{3}$ in all.

The denominator tells the number of equal-sized parts in the whole.

There are 3 equal-sized parts in each whole.

Your child can also think about repeated addition to understand fraction multiplication.

Adding $\frac{1}{3}$ five times is the same as multiplying $\frac{1}{3}$ by 5.

$$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{5}{3}$$

Invite your child to share what he or she knows about fraction multiplication by doing the following activity together.

ACTIVITY FRACTION MULTIPLICATION

Do this activity with your child to explore fraction multiplication.

Materials bowl, measuring cup, ingredients shown in the recipe

- Look at the recipe below for snack mix.

- Rewrite the recipe so that you can make four times as much snack mix. Multiply the amount of each ingredient by 4.

- Make the recipe and enjoy!

Snack Mix

Ingredients

$\frac{1}{4}$ of a cup pretzels

$\frac{3}{4}$ of a cup nuts of your choice

$\frac{1}{2}$ of a cup raisins

$\frac{2}{3}$ of a cup cereal
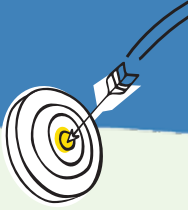
$\frac{1}{3}$ of a cup chocolate chips (optional)

Directions

Mix all the ingredients together. Store in a container.

Answer: 1 cup pretzels, 3 cups nuts, 2 cups raisins, $\frac{8}{3}$ or $2\frac{2}{3}$ cups cereal, $\frac{4}{3}$ or $1\frac{1}{3}$ cups chocolate chips

Explore Fraction Multiplication

What is really going on when you multiply numbers?

MODEL IT
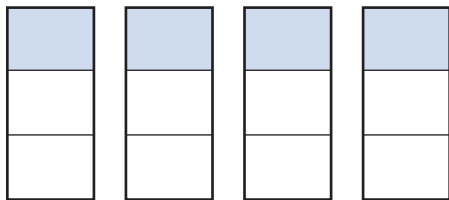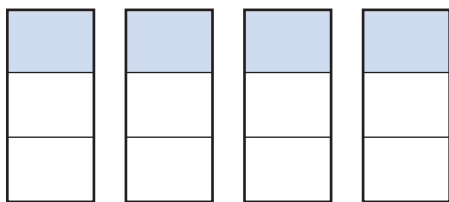
Complete the problems below.

1 Look at the model. Write an addition equation to add the $\frac{1}{3}$s.

2 You can use multiplication with fractions to show repeated addition of fractions, just as you do with whole numbers. Complete the sentence and equation below.

.... copies of $\frac{1}{3}$ = ...

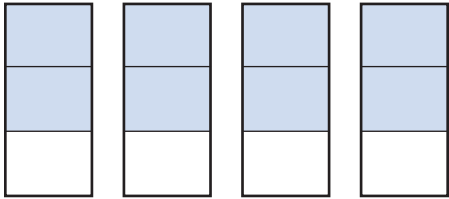.................. $\times \frac{1}{3}$ = ...

DISCUSS IT

- Compare the equations you wrote in problems 1 and 2 to your partner's equations. Are they the same?
- I think multiplying fractions is like repeated addition of fractions because . . .

MODEL IT

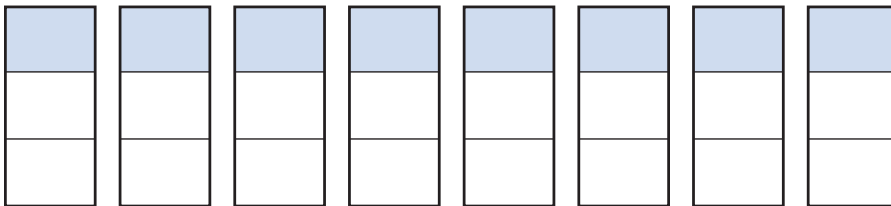**Complete the problems below.**

3 Look at the model below.

a. Write an addition equation to add the $\frac{2}{3}$s.

b. Complete the multiplication equation.

$$\underline{\hspace{3cm}} \times \frac{2}{3} = \underline{\hspace{2.5cm}}$$

4 Look at the model below.

a. Write an addition equation to add the $\frac{1}{3}$s.

b. Complete the multiplication equation.

$$\underline{\hspace{3cm}} \times \frac{1}{3} = \underline{\hspace{2.5cm}}$$

> ## DISCUSS IT
> • Compare the models and equations in problems 3b and 4b. How are they alike? How are they different?
> • How many copies of $\frac{1}{3}$ are in each model?

5 **REFLECT**

Look at your answers to problems 3 and 4. Why can you use addition or multiplication to describe each model?

Prepare for Fraction Multiplication

1 Think about what you know about fraction models. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

Examples

Examples

Examples

fraction model

Examples

Examples

Examples
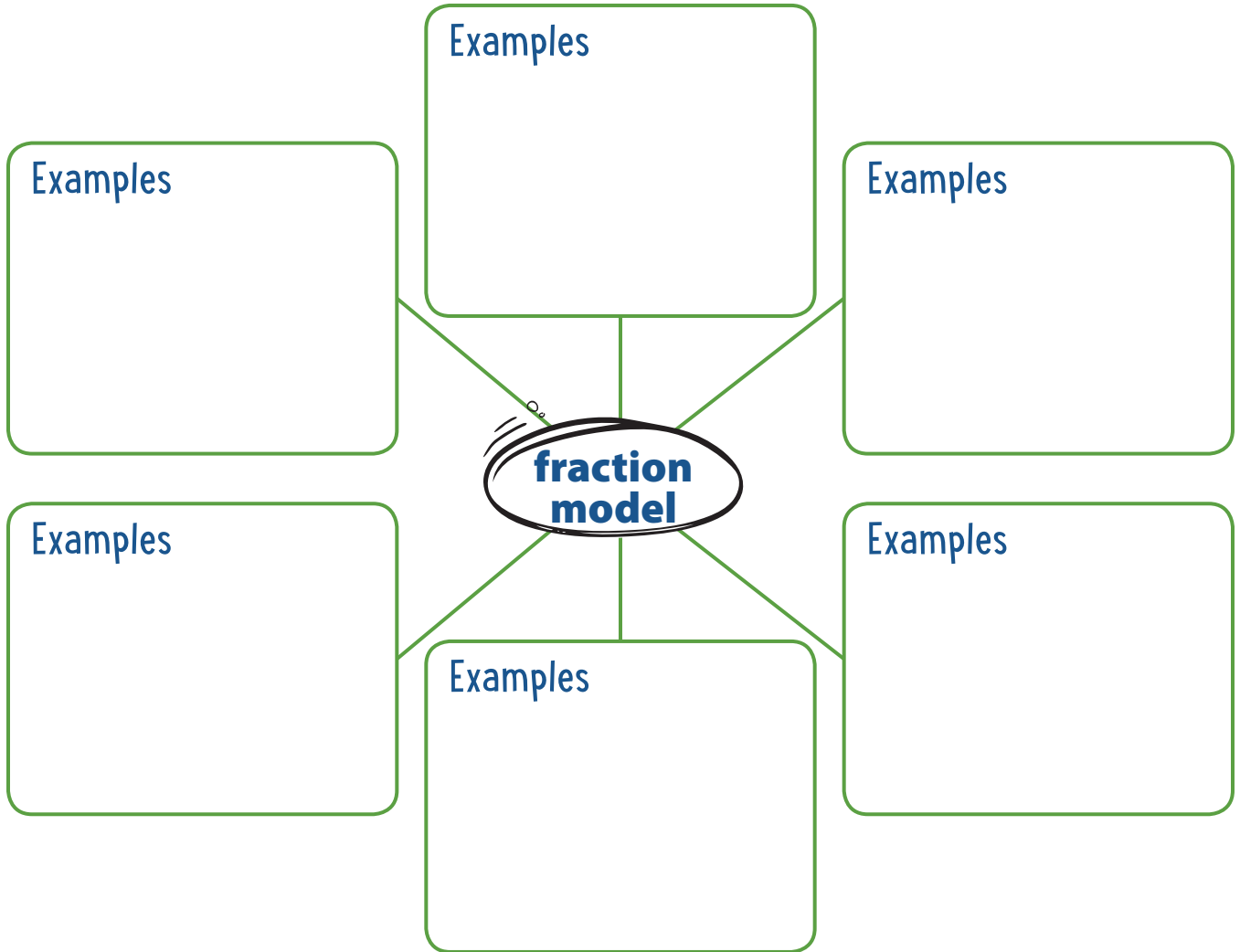
2 Complete the statement and equation below for the fraction model.
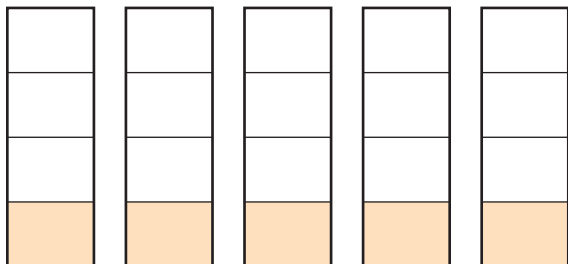
.... copies of $\frac{1}{4}$ = ...

.... $\times \frac{1}{4}$ = ...

Solve.

3 Look at the model below.
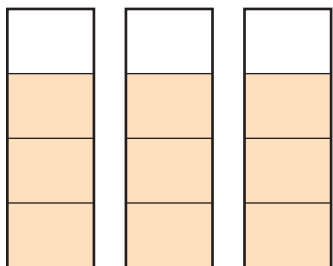
a. Write an addition equation to add the $\frac{3}{4}$s.

b. Complete the multiplication equation.

$$\text{............} \times \frac{3}{4} = \text{............}$$
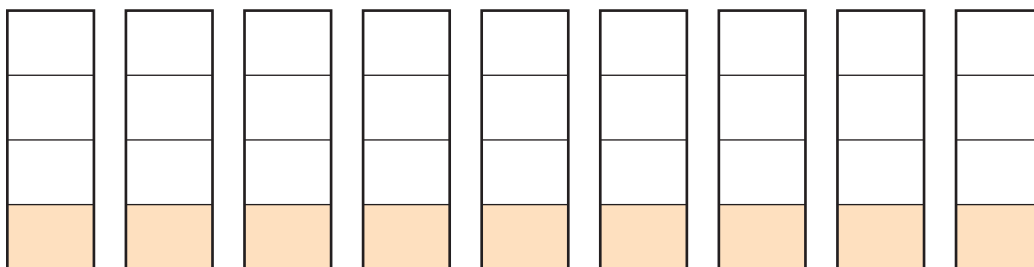
4 Look at the model below.

a. Write an addition equation to add the $\frac{1}{4}$s.

b. Complete the multiplication equation.

$$\text{............} \times \frac{1}{4} = \text{............}$$

Develop Understanding of Fraction Multiplication

MODEL IT: AREA MODELS

Try these two problems.

1 Draw an area model to show $3 \times \frac{2}{5}$. Then write the product.

$3 \times \frac{2}{5} =$ ....

2 Draw an area model to show $6 \times \frac{1}{5}$. Then write the product.

$6 \times \frac{1}{5} =$ ....
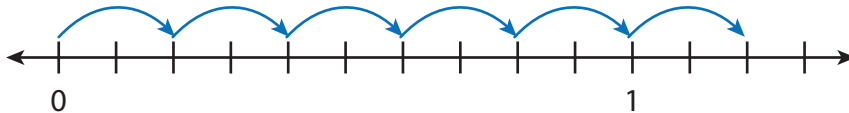
MODEL IT: NUMBER LINES

Use the number lines to show multiplying a fraction by a whole number.

3 Fill in the blanks on the number line to show $4 \times \frac{3}{5}$. Then write the product.
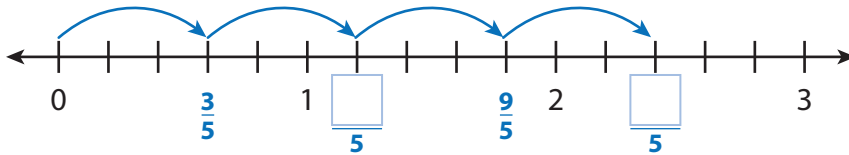
$$4 \times \frac{3}{5} = \text{................}$$

4 Label the number line below to show $6 \times \frac{2}{10}$. Then write the product.

$$6 \times \frac{2}{10} = \text{................}$$

CONNECT IT

Complete the problems below.

5 How are the area models and number line models alike and different in showing fraction multiplication?

6 Choose any model to show $3 \times \frac{2}{4}$. Then write the product.

$$3 \times \frac{2}{4} = \text{................}$$
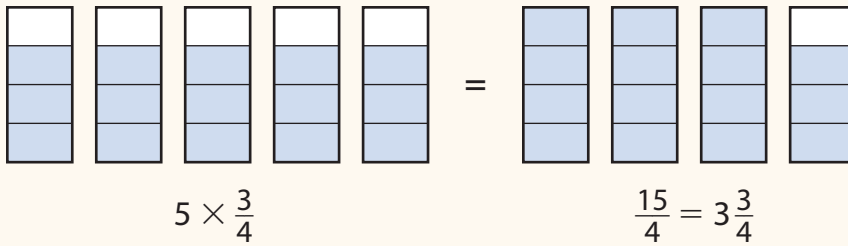
Practice Fraction Multiplication

Study how the Example shows how to multiply a fraction by a whole number. Then solve problems 1–7.

EXAMPLE

Find $5 \times \frac{3}{4}$.

You can use repeated addition. $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{15}{4}$ $\frac{15}{4} = 3\frac{3}{4}$

You can draw a model.

$5 \times \frac{3}{4}$ $\frac{15}{4} = 3\frac{3}{4}$

$5 \times \frac{3}{4} = \frac{15}{4} = 3\frac{3}{4}$

1 Find $6 \times \frac{1}{4}$ using repeated addition.

.... + ... + ... + ... + ... + ... = ...

2 Look at the model. Tell whether each expression shows the product of $3 \times \frac{5}{8}$.

	Yes	No
$5 \times \frac{3}{8}$	Ⓐ	Ⓑ
$\frac{5}{8} + \frac{5}{8} + \frac{5}{8}$	Ⓒ	Ⓓ
$24 \times \frac{1}{5}$	Ⓔ	Ⓕ
$15 \times \frac{1}{8}$	Ⓖ	Ⓗ
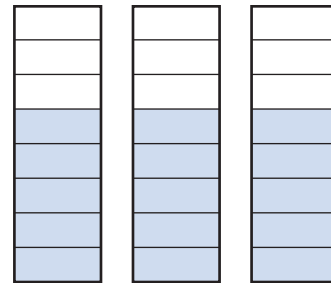
3) The number line below shows .... $\times \dfrac{\square}{\square}$.

0    $\dfrac{3}{10}$ $\dfrac{6}{10}$ $\dfrac{9}{10}$ 1 $\dfrac{12}{10}$ $\dfrac{15}{10}$ $\dfrac{18}{10}$ 2 $\dfrac{21}{10}$ $\dfrac{24}{10}$ 3
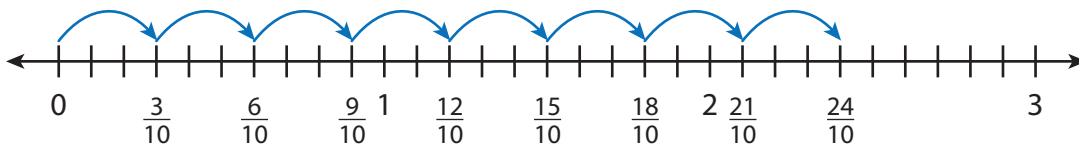
4) Label the number line below and use it to show $3 \times \dfrac{3}{4}$.

0   1   2   3
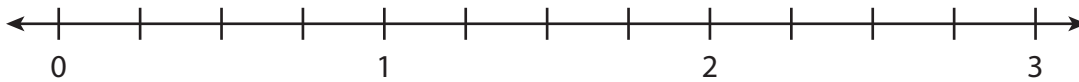
5) Draw a model to show $3 \times \dfrac{4}{5}$.

6) Look at the model you drew in problem 5. Use the digits 2, 3, 4, 5, and 6 to write two different multiplication problems with the same product as $3 \times \dfrac{4}{5}$. (Use a digit more than once.)

$\square \times \dfrac{\square}{\square}$ $\square \times \dfrac{\square}{\square}$

7) Lisa says that $3 \times \dfrac{1}{6}$ and $\dfrac{3}{6} + \dfrac{3}{6} + \dfrac{3}{6}$ have the same value. Is Lisa correct? Explain.
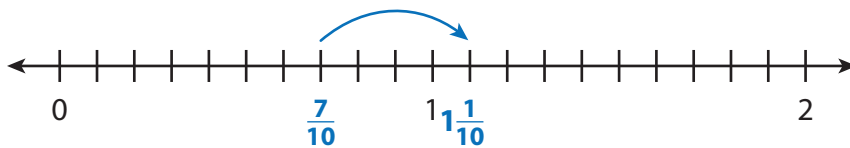
Refine Ideas About Fraction Multiplication

APPLY IT
Complete these problems on your own.

1 **ANALYZE**

How is $3 \times \frac{3}{6}$ the same as $9 \times \frac{1}{6}$?

2 **EVALUATE**

Violet solves $4 \times \frac{7}{10}$ as shown. What does she do wrong?

3 **CONSTRUCT**

Anders triples a recipe and needs $\frac{3}{2}$ cups of flour. He has a $\frac{1}{2}$-cup measuring cup. How many times does he fill the measuring cup with flour? Make a drawing and write a multiplication equation to model the situation.

PAIR/SHARE
Discuss your solutions for these three problems with a partner.

Solution ....

Use what you have learned to complete problem 4.

4 Joaquin runs $\frac{4}{5}$ of a mile each day on Monday, Wednesday, and Friday. How many miles does he run in all?

Part A Describe two methods you could use to solve the problem $3 \times \frac{4}{5}$.

i

ii

Part B Write a different multiplication problem with the same product as $3 \times \frac{4}{5}$. Use $\frac{1}{5}$ instead of $\frac{4}{5}$. ·················

Part C Allison is starting to run each day. She runs $\frac{1}{5}$ of a mile on all 7 days this week. Joaquin and Allison each wanted to run at least 2 miles during the week. Do they? Use a drawing or words to explain how you know.

5 MATH JOURNAL

How are $4 \times \frac{2}{6}$ and $8 \times \frac{1}{6}$ the same? Use a model or words to show how you know.