

Multiply Fractions by Whole Numbers



Dear Family,

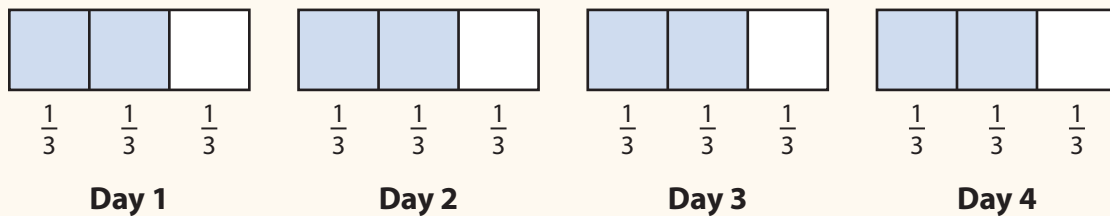
This week your child is learning to multiply fractions by whole numbers to solve word problems.

Your child might see a problem such as the one below.

Randy practices guitar for $\frac{2}{3}$ of an hour on 4 days this week. How long does Randy practice guitar this week?

Using fraction models can help your child solve this word problem.

Each fraction model below is divided into thirds and shows $\frac{2}{3}$, the fractional amount of an hour that Randy practices guitar each day.



The fraction models show $4 \times \frac{2}{3}$. The fraction models show $\frac{8}{3}$.

Your child can also write an equation to find how long Randy practices guitar.

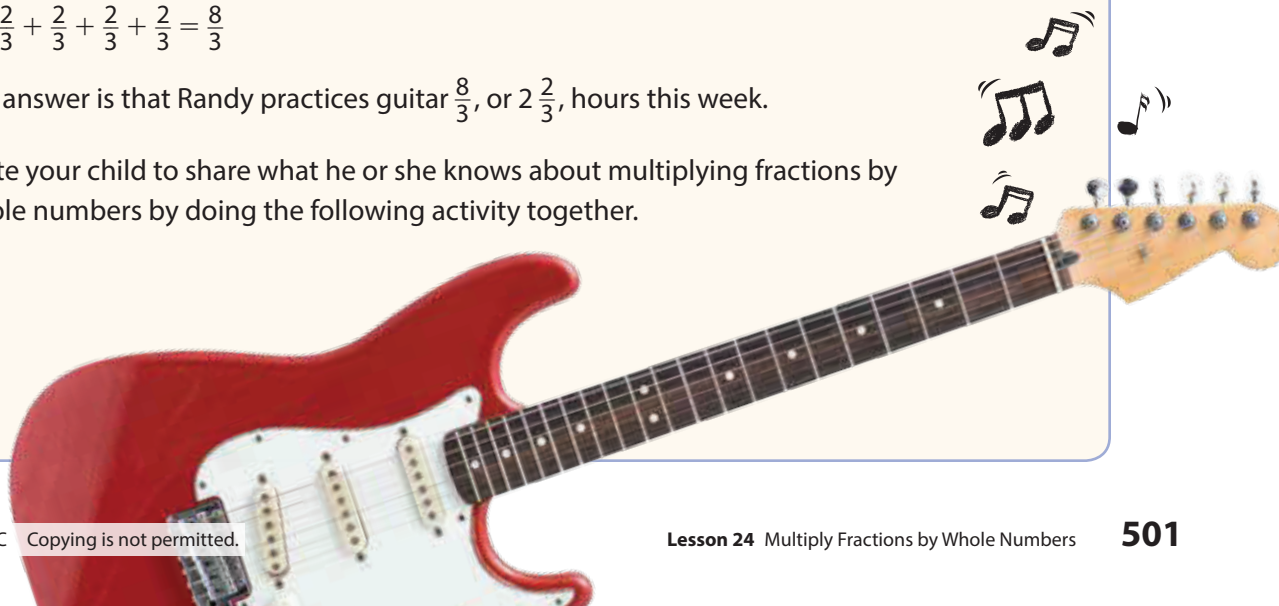
$$4 \times \frac{2}{3} = \frac{8}{3}$$

Then your child can check his or her answer by using repeated addition.

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

The answer is that Randy practices guitar $\frac{8}{3}$, or $2\frac{2}{3}$, hours this week.

Invite your child to share what he or she knows about multiplying fractions by whole numbers by doing the following activity together.



ACTIVITY MULTIPLYING FRACTIONS BY WHOLE NUMBERS

Do this activity with your child to multiply fractions by whole numbers.

Materials large pitcher, measuring cup, ingredients shown in the recipe

- Look at the recipe below for punch.
- Rewrite the recipe so that you can make three times as much punch. Multiply the amount of each ingredient by 3.
- Make the recipe and enjoy!

Cranberry Cooler Party Punch

Ingredients

3 cups cranberry juice

$\frac{1}{2}$ of a cup orange juice

2 cups grape juice

$\frac{1}{4}$ of a cup lemon juice

$\frac{1}{2}$ of a cup crushed pineapple

Directions

Stir all ingredients together.

Pour into serving glasses.



Answer: 9 cups cranberry juice, $\frac{3}{2}$ or $1\frac{1}{2}$ cups orange juice,
6 cups grape juice, $\frac{3}{4}$ of a cup lemon juice, $\frac{3}{2}$ or
 $1\frac{1}{2}$ cups crushed pineapple

Explore Multiplying Fractions by Whole Numbers



Learning Target

- Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.

SMP 1, 2, 3, 4, 5, 6, 7



Previously, you learned about multiplying fractions by whole numbers. In this lesson, you will multiply fractions by whole numbers to solve word problems. Use what you know to try to solve the problem below.

One serving of crackers is about $\frac{3}{10}$ of the whole box of crackers. Bella eats 3 servings this week. What fraction of the box of crackers does she eat?

TRY IT



Math Toolkit

- fraction circles
- fraction tiles
- fraction bars
- number lines 
- grid paper
- fraction models 



DISCUSS IT

Ask your partner: Can you explain that again?

Tell your partner: A model I used was . . . It helped me . . .

CONNECT IT

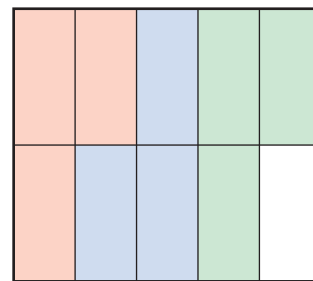
1 LOOK BACK

Explain how you could find the fraction of the box of crackers that Bella eats.

2 LOOK AHEAD

You can multiply a fraction by a whole number to solve problems about combining equal-sized parts.

In the cracker problem, the equal-sized part is the serving size, or $\frac{3}{10}$ of the box of crackers. Bella eats 3 servings. The model at the right shows the fraction of the box of crackers that Bella eats.



$\frac{3}{10}$ of the box = 1 serving

a. You can show three times the serving size

as $3 \times \frac{3}{10}$, or $\frac{3 \times 3}{10}$.

Complete the equation.

$$3 \times \frac{3}{10} = \frac{\square}{\square}$$

b. When you multiply a fraction by a whole number, the answer may be a fraction less than 1 or a fraction greater than 1. You can use what you know about fractions and mixed numbers to tell between which two whole numbers the answer lies. Is the fraction of the box of crackers that

Bella eats less than 1 whole or more than 1 whole?

c. Between which two whole numbers is the fraction of the box of crackers that Bella eats?

3 REFLECT

Describe a real situation when you might want to multiply a fraction by a whole number.

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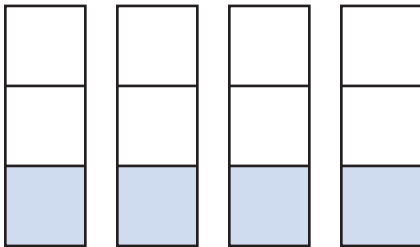
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Prepare for Multiplying Fractions by Whole Numbers

- 1 Think about what you know about multiplying a fraction by a whole number. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

Word	In My Own Words	Example
multiply		
fraction		
whole number		

- 2 Complete the equation to tell how the model shows multiplying a fraction by a whole number.



$$\dots \times \dots = \dots$$

whole number \times fraction = product

3 Solve the problem. Show your work.

A family eats $\frac{3}{8}$ of a whole box of cereal each day. What fraction of the box of cereal does the family eat in 2 days?



Solution

4 Check your answer. Show your work.

Develop Multiplying Fractions by Whole Numbers

Read and try to solve the problem below.



James is baking cookies. One batch of cookies uses $\frac{2}{4}$ of a teaspoon of vanilla. James wants to make 3 batches of cookies. How much vanilla does James need?



TRY IT



Math Toolkit

- fraction circles
- fraction tiles
- measuring spoons
- fraction bars
- number lines 
- fraction models 



DISCUSS IT

Ask your partner: How did you get started?

Tell your partner: I knew ... so I ...

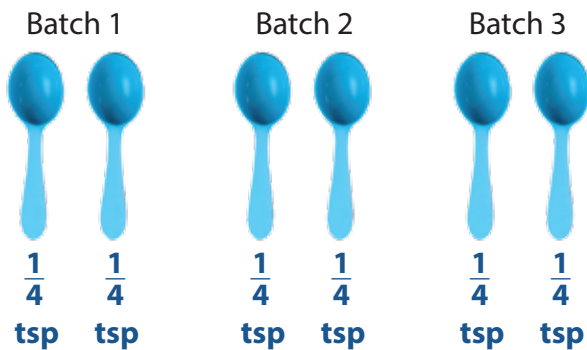
Explore different ways to understand multiplying fractions by whole numbers to solve word problems.

James is baking cookies. One batch of cookies uses $\frac{2}{4}$ of a teaspoon of vanilla. James wants to make 3 batches of cookies. How much vanilla does James need?

PICTURE IT

You can use a picture to help solve the word problem.

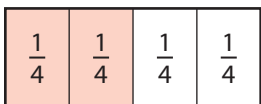
The picture shows six $\frac{1}{4}$ teaspoons for 3 batches.



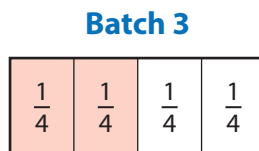
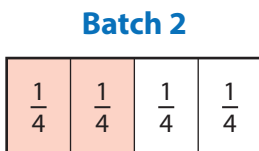
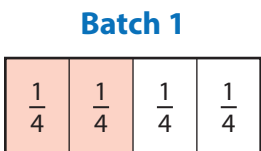
MODEL IT

You can also use fraction bars to solve the word problem.

The fraction bar below is divided into fourths and shows $\frac{2}{4}$, the amount of vanilla in each batch.



The model below shows the amount of vanilla needed for 3 batches.



CONNECT IT

Now you will use the problem from the previous page to help you understand how to multiply a fraction by a whole number to solve a word problem.

- 1 How much vanilla does James need for each batch?
- 2 How many batches does James want to make?
- 3 Write an equation to find how many teaspoons of vanilla James needs.

$$\begin{array}{ccc} \dots & \times & \dots = \dots \\ \text{number of} & \text{teaspoon} & \text{teaspoons} \\ \text{batches} & \text{for 1 batch} & \text{needed} \end{array}$$

- 4 Explain how you can check your answer using repeated addition.
- 5 Write the fraction that shows how many teaspoons of vanilla James needs as a mixed number.
- 6 Between which two whole numbers of teaspoons is the amount of vanilla James needs?
- 7 How is the fraction bar model like the teaspoon model in showing how to multiply a fraction by a whole number?

8 REFLECT

Look back at your **Try It**, strategies by classmates, and **Picture It** and **Model It**. Which models or strategies do you like best for multiplying a fraction by a whole number to solve a word problem? Explain.

.....

.....

.....

APPLY IT

Use what you just learned to solve these problems.

- 9 Micah jogs $\frac{8}{10}$ of a mile. Sarah jogs this same distance 3 days in a row. How far does Sarah jog altogether?

Solution

- 10 On Monday, Sylvia spends $\frac{5}{12}$ of a day driving to her cousin's house. On Friday, she spends the same amount of time driving home. What fraction of a day does Sylvia spend driving to her cousin's house and back?

Solution

- 11 Isabella fills her fish tank using a water jug. The water jug holds $\frac{4}{5}$ of a gallon of water. Isabella uses 9 full jugs to fill her fish tank. How many gallons of water does the fish tank hold?
- (A) $\frac{36}{45}$ gallons (B) $2\frac{3}{5}$ gallons
(C) $7\frac{1}{5}$ gallons (D) $36\frac{1}{5}$ gallons

Practice Multiplying Fractions by Whole Numbers

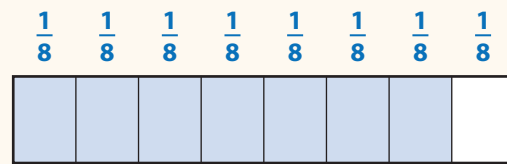
Study the Example showing how to multiply a fraction by a whole number to solve a word problem. Then solve problems 1–7.

EXAMPLE

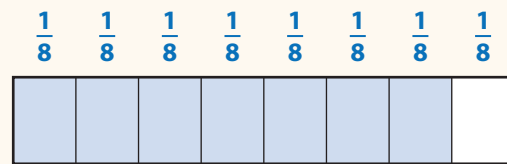
Malik doubles a cookie recipe to make two batches of cookies. He uses $\frac{7}{8}$ of a cup of flour for each batch. How much flour does Malik use for both batches?

$$\begin{array}{rcccc}
 2 & \times & \frac{7}{8} & = & \frac{14}{8} \\
 \uparrow & & \uparrow & & \uparrow \\
 \text{number of} & & \text{cups per} & & \text{cups} \\
 \text{batches} & & \text{batch} & & \text{used}
 \end{array}$$

Malik uses $\frac{14}{8}$, or $1\frac{6}{8}$, cups of flour.



Batch 1



Batch 2

- 1 Benson spends $\frac{5}{6}$ of an hour reading each day for 3 days. How long does Benson spend reading this week?

$$3 \times \frac{5}{6} = \frac{\square}{\square} = \square \frac{\square}{\square}$$

Benson spends hours reading.

- 2 Show how to use repeated addition to check your answer in problem 1.
- 3 Sabrina rides her bike $\frac{3}{4}$ of a mile. Katrin rides her bike this same distance on each of 4 days. How far does Katrin ride her bike altogether?



- 4 Jorge coaches soccer for $\frac{1}{12}$ of the day on Saturday. That day he also coaches tennis and swimming, each for the same amount of time as soccer. What fraction of the day does Jorge coach on Saturday? Show your work.

Solution

- 5 Greta plants flower seeds in 12 pots. She uses $\frac{2}{6}$ of a bag of flower seeds in each pot. How many bags of flower seeds does Greta use? Show your work.

Solution

**Leslie practices the flute for $\frac{2}{6}$ of an hour 3 times this week.
She practices piano for $\frac{2}{3}$ of an hour 2 times this week.**

- 6 Which expressions can be used to show how much time Leslie practices both the flute and piano this week?
- Ⓐ $(3 \times \frac{2}{6}) + (2 \times \frac{2}{3})$ Ⓑ $5 \times (\frac{2}{6} + \frac{2}{3})$
- Ⓒ $\frac{2}{6} + \frac{2}{6} + \frac{2}{6} + \frac{2}{3} + \frac{2}{3}$ Ⓓ $\frac{(3 \times 2)}{6} + \frac{(2 \times 2)}{3}$
- Ⓔ $(2 \times \frac{2}{6}) + (3 \times \frac{2}{3})$
- 7 Which does Leslie practice for a longer amount of time, the flute or the piano? Show your work.

Solution



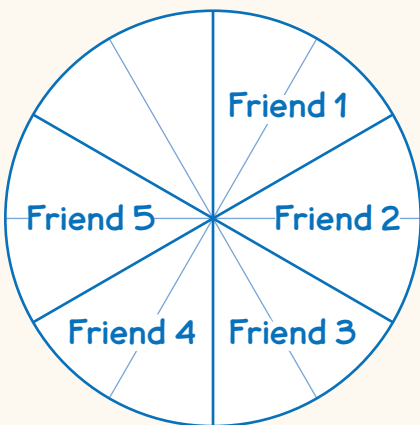
Refine Multiplying Fractions by Whole Numbers

Complete the Example below. Then solve problems 1–8.

EXAMPLE

Five friends share a pizza. Each friend eats $\frac{2}{12}$ of the pizza. How much pizza do they eat altogether?

Look at how you could show your work using a model.



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

Solution

The student labeled the model to show each of the 5 friends!



PAIR/SHARE

How could you write the expression in a different way?

APPLY IT

- Each of 4 tables at a party is set with a bowl of grapes. Each bowl contains $\frac{5}{8}$ of a pound of grapes. How many pounds of grapes are there altogether? Show your work.

Solution

Will the total weight be more or less than 1 whole pound?

PAIR/SHARE

Check your answer using repeated addition.

- 2 Leo paints for $\frac{2}{3}$ of an hour each day on Monday, Tuesday, Thursday, and Friday. How long does Leo paint this week? Show your work.

Does Leo paint for the same amount of time each day?



Solution

- 3 Karime walks $\frac{3}{4}$ of a mile each day for 5 days. The number of miles Karime walks altogether is between which two whole numbers?
- (A) 0 and 1
 - (B) 1 and 2
 - (C) 3 and 4
 - (D) 4 and 5

Lacey chose (A) as the correct answer. How did she get that answer?

PAIR/SHARE

Draw a model to show the problem situation.

Make sure your answer is reasonable!

PAIR/SHARE

How did you get the answer you chose?

- 4 A choir concert lasts for $\frac{5}{6}$ of an hour. The choir performs 3 concerts on the weekend. Find the number of hours the choir performs on the weekend.

The answer is between which two whole numbers?

- (A) 0 and 1
- (B) 1 and 2
- (C) 2 and 3
- (D) 3 and 4

- 5 Find the products to complete the table.

	Product
$3 \times \frac{4}{6}$	
$2 \times \frac{4}{5}$	
$5 \times \frac{2}{3}$	
$2 \times \frac{3}{6}$	

- 6 Morgan buys 6 tomatoes that each weigh $\frac{1}{4}$ of a pound.
 Russ buys 14 tomatoes that each weigh $\frac{1}{8}$ of a pound.
 Who buys tomatoes that weigh more? Show your work.



..... buys tomatoes that weigh more.

- 7 Tell whether each expression has a value of $\frac{15}{4}$.

	Yes	No
$5 \times \frac{3}{4}$	(A)	(B)
$1 \times \frac{5}{4}$	(C)	(D)
$15 \times \frac{1}{4}$	(E)	(F)

8 MATH JOURNAL

Use words, equations, or pictures to explain how to find the answer to the problem below.

Brittany practices hitting softballs for $\frac{2}{3}$ of an hour each day for three days.

For how many hours does she practice hitting softballs?



SELF CHECK Go back to the Unit 4 Opener and see what you can check off.