Fractions: Sample Lesson Grade 4

Oklahoma C3 Standards: 4.NF.2; 4.NF.4a; 4.NF.4c; MP.1; MP.2; MP.4; MP.5

This lesson addresses the above standards and builds a foundation for understanding fractions and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number. Students need multiple exposures to and work with fractions using concrete models and pictorial representations prior to achieving procedural fluency.

OKLAHOMA STATE DEPARTMENT OF EDUCATION

Stage	Actions	Resources
Engage	Read aloud, The Doorbell Rang, by Pat Hutchins. As the story is read, pause to provide students an opportunity to explore the mathematical situations presented as more and more children arrive and they must share the cookies. Examples include: **What happened when the number of people sharing cookies increased?** **What do you think would happen if they had more people to feed than cookies?**	Children's Literature: *The Doorbell Rang* by Pat Hutchins; Manipulatives and/or circular cut outs to simulate dividing the cookies
Explore	Extending prior knowledge and ideas presented in the story, ask students to solve the following problem in a group of two or three: **There are 6 people at a party. Each will eat about ½ pound of steak for dinner. How many pounds of steak are needed for the party?** **Explain how you solved the problem.**	Manipulatives and/or circular cut outs
Explain	Ask students: **Explain how your group solved this problem.** **How is this example like what we read in the story?**	

How is this example different from the examples we experienced in the story?

Is there another way to represent your solution?

How did you use fractions to solve the problem?

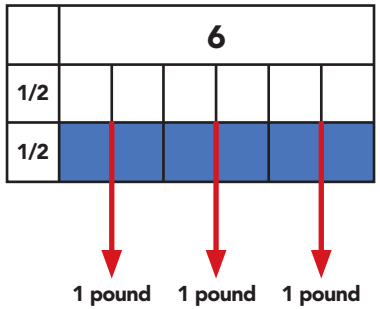
What does the numerator represent?

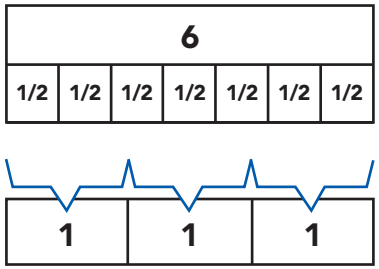
What does the denominator represent?

What happens to the amount everyone receives as you share with more and more people?

How did the manipulatives help you solve the problem?

Possible explanations include the following:





Above are two different graphics that could be used to illustrate this scenario. The first picture shows 6 × ½. The bottom row is shaded because it is not part of the multiplication problem. Since two halves make a whole, there are 3 pounds of steak needed for the party.

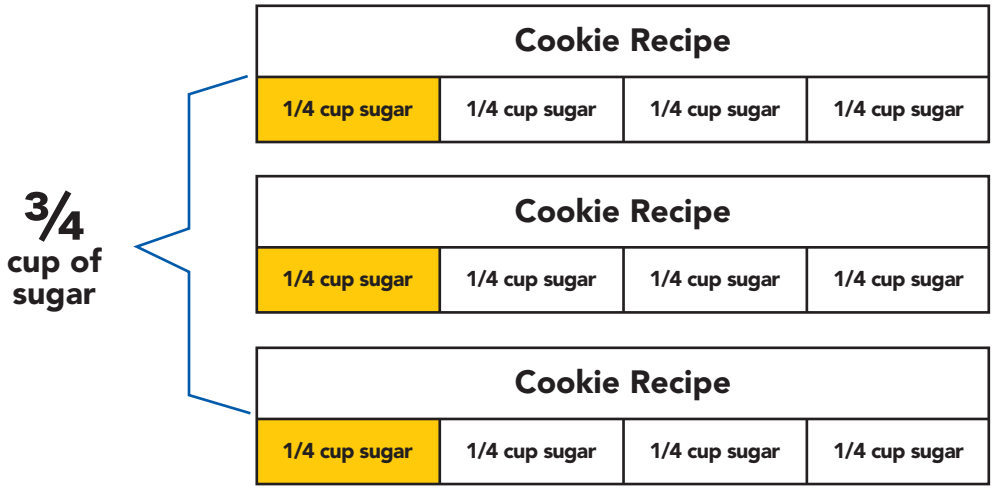
The second graphic also shows 6 × ½ and the combination of two halves to make a whole, resulting in an answer of 3 pounds of steak needed for the party.

Elaborate/ Extend

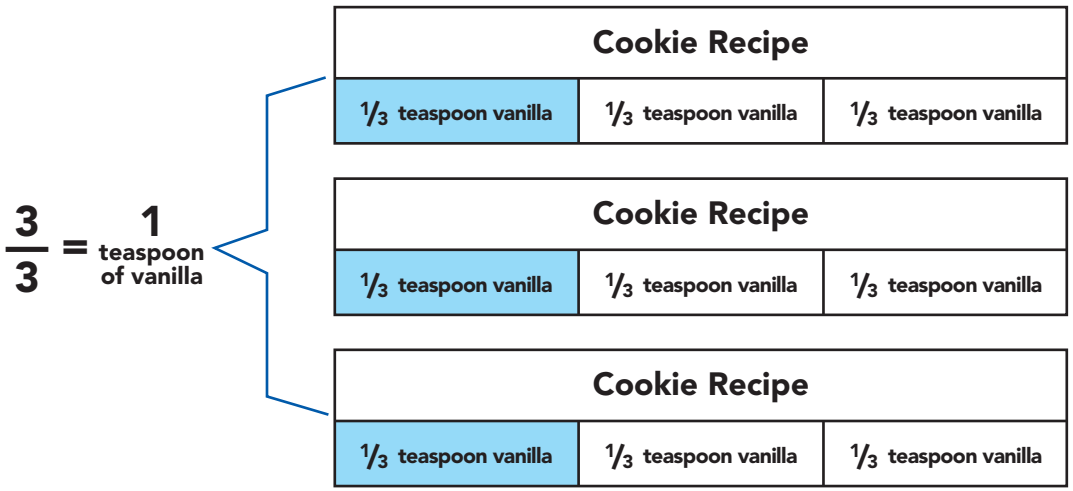
Provide students with additional problem scenarios to extend their thinking. Examples include the following:

EXAMPLE 1
Noah is baking cookies. His recipe calls for ¼ cup of sugar and 13 teaspoon of vanilla. He has had so many requests for his cookies, that he must triple his recipe. How much sugar will Noah need? How much vanilla will he need? Use pictures, words, numbers, and/or symbols to model your problem solving.

Possible explanations may include:



$$3 \times \tfrac{1}{4} = \frac{3 \times 1}{4} = \tfrac{3}{4} \text{ cup of sugar}$$



$$3 \times \tfrac{1}{3} = \frac{3 \times 1}{3} = \frac{3}{3} = 1 \text{ teaspoon of vanilla}$$

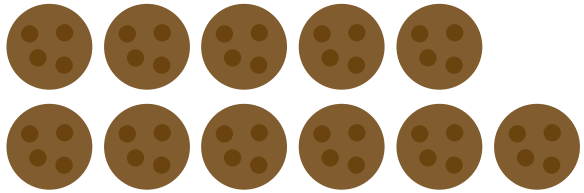
EXAMPLE 2

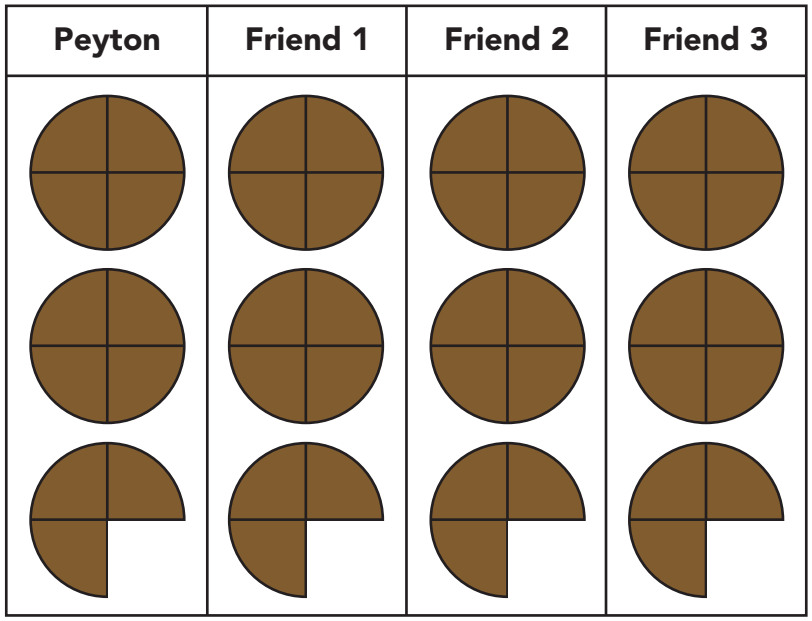
This example develops understanding of the connections between multiplication and division with whole numbers and fractions and includes an opportunity to revisit the number line.

Peyton has 11 cookies. He wants to share his cookies with three friends. How many cookies will Peyton and his friends each get?
Explain your solution process and justify your response.

Provide students with manipulatives/circular cut outs to model cookies to help them solve the problem. They may also draw a picture to help them solve the problem.

Possible explanations may include:
There are 4 people in all, so 11 cookies have to be shared among 4 friends. Cookies can be divided into parts. Dividing the cookies by 4 is the same as multiplying by ¼.





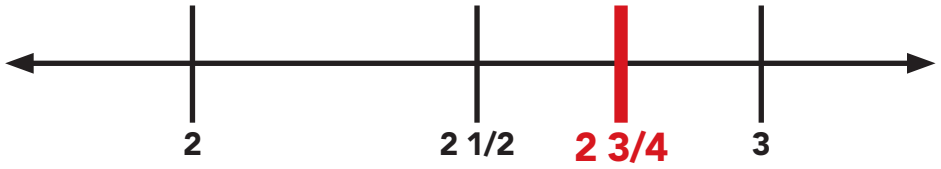
***Note:**
Students may also choose first to divide the cookies into halves since they may be more familiar with the concept of dividing something in half to share. Whichever approach they choose, they should be able to explain their reasoning.

In the picture, you can see how every cookie piece is shown. They are divided into fourths because there are four friends who each want to share the cookies. Peyton and his three friends each receive two whole cookies. Then there are three cookies left to share. The friends each get ¾ of another cookie, so that everyone gets 2 ¾ cookies in all.

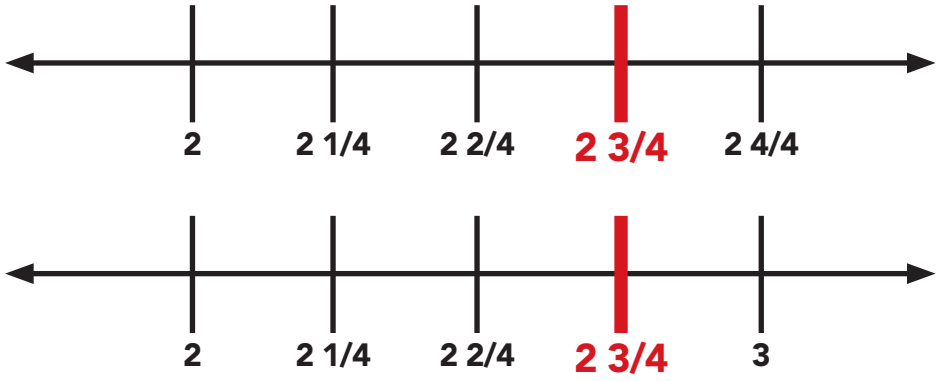
2 ¾ is the same as 11/4. You can see in the picture that each friend has 11/4 cookies.

11 × ¼ = (11 × 1) / 4 = 11/4
11/4 = 2 ¾

The answer is between 2 and 3. On a number line, the answer would be located between the 2 and the 3 as shown below.



Other examples of number lines that students may create are as follows:



As students provide explanations, ask them to connect their visual representations with the symbolic representation of 11 × ¼ = 11/4. They may discuss with their groups what this equation means and how it connects to the drawings or models they developed when solving the problem.

	In addition, provide students with examples of such problems that are solved incorrectly, and ask them to critique the problem solving and explain where the reasoning was flawed. In the above example, provide a solution scenario where a written explanation shows an answer of 3 cookies. Ask students to use mathematics to critique the solution and explain appropriate reasoning for their responses.	
Evaluate	Assess students informally as they explore the problem scenario, explain their process for solving the problem, and represent their fractions on a number line. Students need multiple exposures to and work with fractions using concrete models and pictorial models. They may not connect the concrete and pictorial representations to the symbolic representation the first few times they work with the new concepts. Provide students an opportunity to reflect on their thinking using a prompt such as the one below: **Describe a time when you would use multiplication to multiply a fraction by a whole number?**	