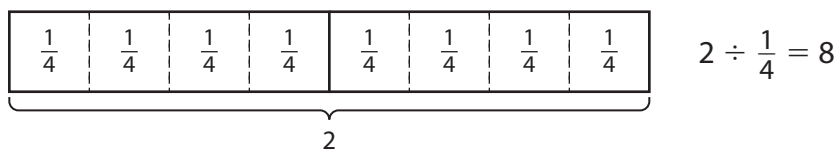


Dear Family,

This week your student is exploring division with fractions.

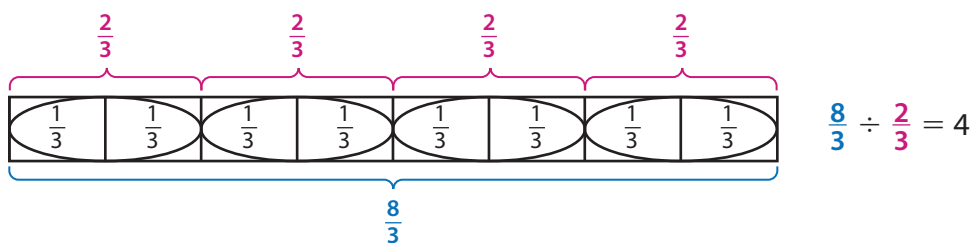
You can think of the division expression $2 \div \frac{1}{4}$ as asking the question *How many parts of size $\frac{1}{4}$ are there in 2?* Using a bar model, you can divide each of 2 wholes into fourths and count to see that there are 8 parts of size $\frac{1}{4}$ in 2.



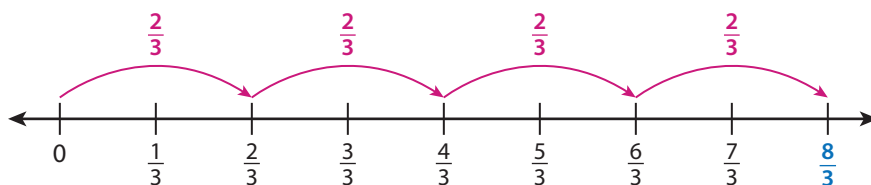
Your student will be learning to model division situations like the one below.

How many pieces of yarn that are $\frac{2}{3}$ foot long can be cut from a piece of yarn that is $\frac{8}{3}$ feet long?

- **ONE WAY** to show how many $\frac{2}{3}$ s are in $\frac{8}{3}$ is to use a bar model.



- **ANOTHER WAY** is to use a number line.



Both models show that a piece of yarn that is $\frac{8}{3}$ feet long can be cut into 4 pieces that are each $\frac{2}{3}$ foot long.

▶ Use the next page to start a conversation about dividing with fractions.

Activity Exploring Division with Fractions

➤ Do this activity together to look for patterns in division with fractions.

What patterns do you notice in each set?

SET 1

$$2 \div \frac{1}{2} = 4$$

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

$$2 \div \frac{1}{8} = 16$$

SET 2

$$1 \div \frac{1}{2} = 2$$

$$1 \div \frac{1}{4} = 4$$

$$1 \div \frac{1}{8} = 8$$

SET 3

$$\frac{1}{2} \div \frac{1}{2} = 1$$

$$\frac{1}{2} \div \frac{1}{4} = 2$$

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



Do you notice any patterns between two of the sets?

? **UNDERSTAND:** What happens when you divide with fractions?

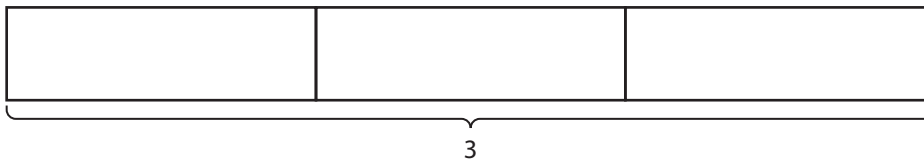
Explore Division with Fractions

Model It

► Complete the problems about dividing a whole number by a fraction.

1 In carpentry class, students are making wooden stacking games. Brett cuts a board that is 3 feet long into pieces that are each $\frac{1}{4}$ foot long to make his game.

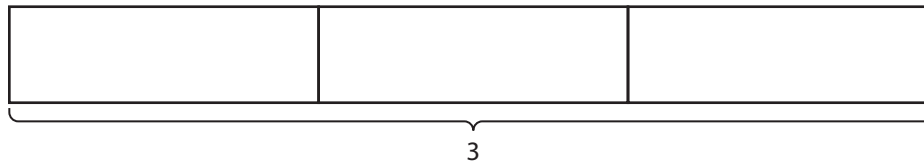
a. Complete the model to show $3 \div \frac{1}{4}$.



b. Brett cuts his board into _____ equal-size pieces.

2 Madison cuts a board that is 3 feet long into pieces that are each $\frac{3}{4}$ foot long for her stacking game.

a. Complete the model to show $3 \div \frac{3}{4}$.



b. Madison cuts her board into _____ equal-size pieces.



Wooden stacking game

DISCUSS IT

Ask: Why are your two models the same in some ways and different in some ways?

Share: I noticed that when the divisor changes from $\frac{1}{4}$ to $\frac{3}{4}$...

Learning Target SMP 2, SMP 3, SMP 7

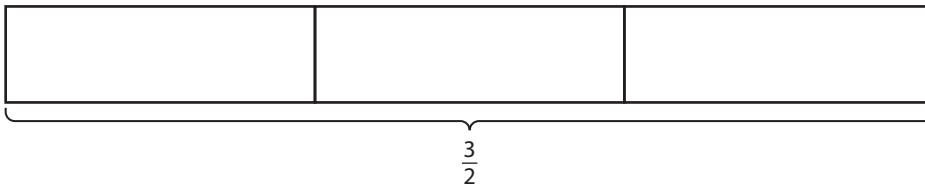
Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

Model It

► Complete the problems about dividing a fraction by a fraction.

- 3 Lin starts with a board that is $\frac{3}{2}$ feet long. She cuts it into pieces that are each $\frac{1}{4}$ foot long for her stacking game.

a. Complete the model to show how many pieces Lin cuts her board into.



b. Write a division equation that represents your model and shows how many pieces Lin cuts her board into. What related multiplication equation does your model represent?

c. Lin cuts her board into _____ equal-size pieces.

- 4 **Reflect** How are models for dividing with fractions similar to models for dividing with whole numbers? How are they different?

DISCUSS IT

Ask: How does your model show the number of pieces Lin cuts her board into?

Share: The whole model shows 3 halves, so I know that 1 half is shown by ...

Prepare for Division with Fractions

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

In My Own Words

My Illustrations

divisor

Examples

Non-Examples

- 2 Circle the equation that shows a divisor of 6.

$$6 \div \frac{1}{2} = 12$$

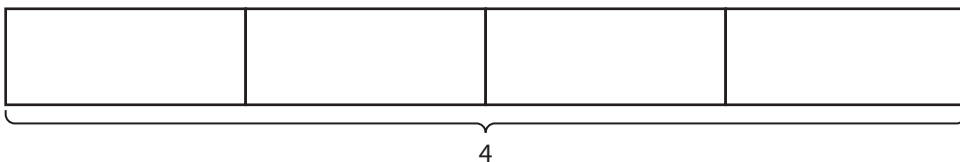
$$12 \div 6 = 2$$

$$12 \div 2 = 6$$

➤ Complete problems 3–5.

3 Lola cuts a string that is 4 feet long into pieces that are each $\frac{1}{6}$ foot long.

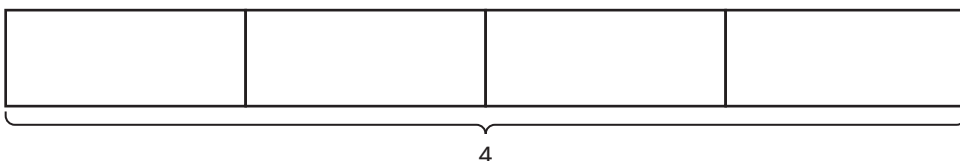
a. Complete the model to show $4 \div \frac{1}{6}$.



b. Lola cuts her string into _____ equal-size pieces.

4 Robert cuts a string that is 4 feet long into pieces that are each $\frac{2}{6}$ foot long.

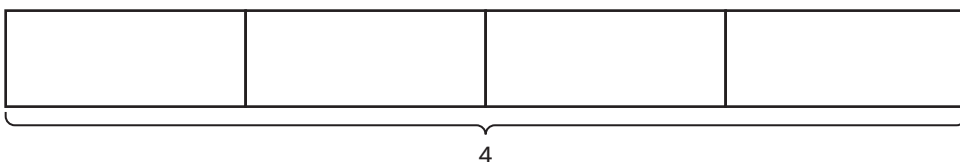
a. Complete the model to show $4 \div \frac{2}{6}$.



b. Robert cuts his string into _____ equal-size pieces.

5 Hiroko cuts a string that is 4 feet long into pieces that are each $\frac{4}{6}$ foot long.

a. Complete the model to show $4 \div \frac{4}{6}$.



b. Hiroko cuts her string into _____ equal-size pieces.



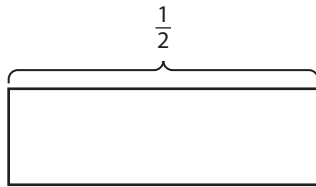
? **UNDERSTAND:** What happens when you divide with fractions?

Develop Understanding of Division with Fractions

Model It: Bar Models

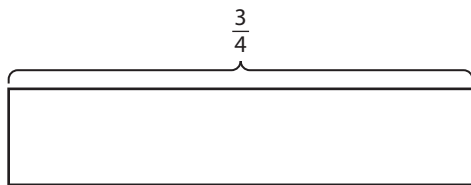
► Try these two problems about dividing a fraction by a fraction.

- 1 Uma lives near a path that is $\frac{1}{2}$ mile long. She wants to know how many times she needs to run the path in order to run $\frac{6}{4}$ miles.
- a. Complete the model to show how many $\frac{1}{2}$ s make $\frac{6}{4}$.



- b. How many $\frac{1}{2}$ s make $\frac{6}{4}$?
- c. Use your model to write a division equation that represents this situation. What related multiplication equation represents your model?
- d. Uma needs to run the $\frac{1}{2}$ -mile path _____ times to run $\frac{6}{4}$ miles.

- 2 a. Complete the model to show how many $\frac{3}{4}$ s make $\frac{6}{4}$.



- b. Write a division equation and a related multiplication equation that represent your model.



DISCUSS IT

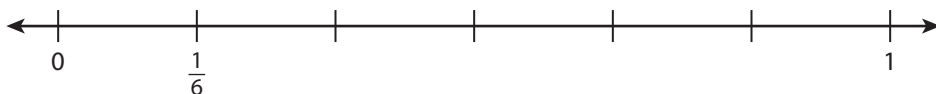
Ask: How can you find a quotient by starting with a model that shows the divisor?

Share: Knowing how to multiply with fractions can help you divide with fractions because ...

Model It: Number Lines

► Try this problem about dividing with fractions.

- 3 a. Use the number line to show $\frac{4}{6} \div \frac{1}{6}$.



- b. What is the quotient $\frac{4}{6} \div \frac{1}{6}$?

DISCUSS IT

Ask: How would you change your number line to show dividing $\frac{4}{6}$ by $\frac{1}{3}$?

Share: I think my number line shows dividing $\frac{4}{6}$ by $\frac{1}{6}$ because ...

CONNECT IT

► Complete the problems below.

- 4 How can you show the quotient $\frac{4}{6} \div \frac{1}{6}$ with a bar model? How is using a bar model similar to showing the quotient with a number line? How is it different?

- 5 Draw a model to show $\frac{10}{8} \div \frac{1}{4}$. How many $\frac{1}{4}$ s are in $\frac{10}{8}$?

Practice Division with Fractions

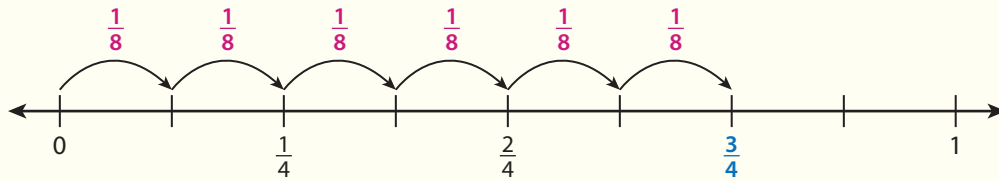
- Study how the Example shows division of a fraction by a fraction. Then solve problems 1–4.



Example

Mr. Díaz has $\frac{3}{4}$ yard of ribbon to make badges for the science fair. He uses $\frac{1}{8}$ yard of ribbon for each badge. How many badges can Mr. Díaz make?

Find the number of $\frac{1}{8}$ s in $\frac{3}{4}$.



$$\frac{3}{4} \div \frac{1}{8} = 6$$

Mr. Díaz can make 6 badges.

- 1
 - a. How does the model in the Example show how much ribbon Mr. Díaz starts with?
 - b. How does the model show how much ribbon Mr. Díaz uses for each badge?
 - c. How many $\frac{1}{8}$ s are in $\frac{3}{4}$?
- 2 Another day, Mr. Díaz makes badges using $\frac{3}{8}$ yard of ribbon for each badge. He starts with another $\frac{3}{4}$ yard of ribbon. Describe how you can change the model in the Example to show $\frac{3}{4} \div \frac{3}{8}$.

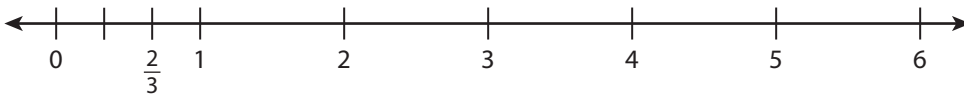


3 Rosa is filling tortillas. She puts $\frac{2}{3}$ cup of vegetables in each tortilla. She has 6 cups of vegetables.

a. Rosa says that to find how many tortillas she can fill, she can first find how many $\frac{1}{3}$ cups are in 6 cups. What else does Rosa need to do to find how many tortillas she can fill?

b. Do you expect the number of tortillas Rosa can fill to be *less than* or *greater than* 6? Explain.

c. Complete the model to show how many $\frac{2}{3}$ s are in 6.



d. Complete the division equation to show how many tortillas Rosa can fill.


$$6 \div \frac{2}{3} = \underline{\hspace{2cm}}$$

Rosa can fill tortillas.

4 Michael has $\frac{12}{8}$ cups of orange juice in a jar. He pours the juice into glasses that each hold $\frac{3}{4}$ cup. How many glasses can he fill? Draw a model to show your work.

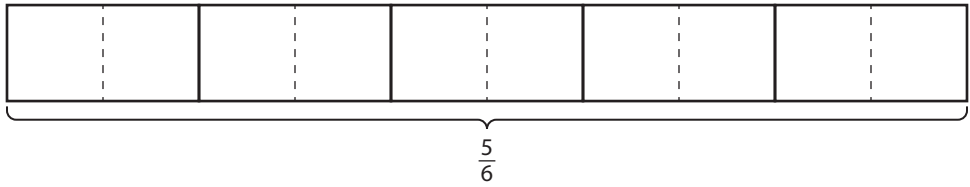
SOLUTION _____

Refine Ideas About Division with Fractions

Apply It  **Math Toolkit** fraction bars, fraction tiles, grid paper, number lines

► **Complete problems 1–5.**

1 Interpret Look at the model below. Write a division equation that the model can represent. Explain how to find the quotient using the model.



2 Analyze Nikia says that $\frac{3}{2} \div \frac{1}{4}$ equals $\frac{3}{8}$. Draw a model and use words to explain why Nikia’s statement is not reasonable.

3 Justify Look at problem 2. Explain why the quotient is greater than the dividend when you divide by $\frac{1}{4}$.

- 4 Aiyana needs $\frac{3}{8}$ pound of sweet potatoes for each serving of sweet potato fries. She wants to know how many servings of sweet potato fries she can make with $1\frac{1}{2}$ pounds of sweet potatoes.

PART A Write a division expression and draw a model to represent the situation.



PART B Use your model to explain how to find the quotient and what the quotient means.

- 5 **Math Journal** What does it mean to divide with fractions? Use models and words to describe how to divide with fractions. Use $\frac{3}{4} \div \frac{3}{8}$ in your response.

✓ End of Lesson Checklist

- INTERACTIVE GLOSSARY** Write a new entry for *reasonable*. Tell what you do when you determine whether a statement is *reasonable*.