

# Fractions as Division



Dear Family,

This week your child is learning how fractions and division are related.

He or she might see a problem like the one below.

*Three family members equally share 4 granola bars. How much does each family member receive?*

This word problem can be represented as a division problem. The family equally shares 4 granola bars among 3 people, so the division problem to solve is  $4 \div 3$ .

A model is a useful way to show the problem.

The model below shows 4 wholes. Each whole is divided into 3 parts.



Each family member receives  $\frac{1}{3}$  of each of 4 whole bars. So, the answer to the division problem  $4 \div 3$  is  $\frac{4}{3}$ . You can say that the fraction  $\frac{4}{3}$  represents the division problem  $4 \div 3$ .

This shows how fractions and division are related. You can think of fractions as the division of two numbers.

Another way to write the fraction  $\frac{4}{3}$  is to show it as a mixed number. So, each family member receives  $\frac{4}{3}$ , or  $1\frac{1}{3}$ , granola bars.

Invite your child to share what he or she knows about how fractions and division are related by doing the following activity together.



## ACTIVITY FRACTIONS AS DIVISION

Do this activity with your child to explore fractions as division.

Work with your child to find opportunities to practice modeling a division situation as a fraction.

- Together with your child, think of things that can be shared equally among family members, such as boxes of crackers or bags of grapes.
- Choose one idea. Work together with your child to show how to equally divide a number of the items among the people in your family.

*Example:* 4 family members equally share 7 bags of trail mix.

- Have your child write the idea as a division problem.

*Example:*  $7 \div 4 = \frac{7}{4}$

- Have your child explain how much of the item each family member will get.

*Example:* Each person will get  $\frac{7}{4}$ , or  $1\frac{3}{4}$ , bags of trail mix.



# Explore Fractions as Division

You know that division is used for equal sharing and that fractions represent a number of equal parts of a whole. In this lesson, you will learn how division and fractions are related. Use what you know to try to solve the problem below.

**Mrs. Tatum needs to share 4 fluid ounces of red paint equally among 5 art students. How many ounces of red paint will each student get?**

## TRY IT

## Learning Target

- Interpret a fraction as division of the numerator by the denominator ( $\frac{a}{b} = a \div b$ ). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

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



## Math Toolkit

- fraction circles or tiles
- fraction bars
- fraction models
- tenths grids
- number lines
- index cards

## DISCUSS IT

**Ask your partner:** Why did you choose that strategy?

**Tell your partner:** At first, I thought . . .

# CONNECT IT



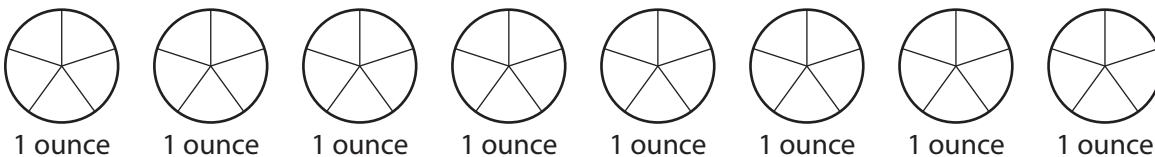
## 1 LOOK BACK

Explain how to find the amount of paint each student gets.

## 2 LOOK AHEAD

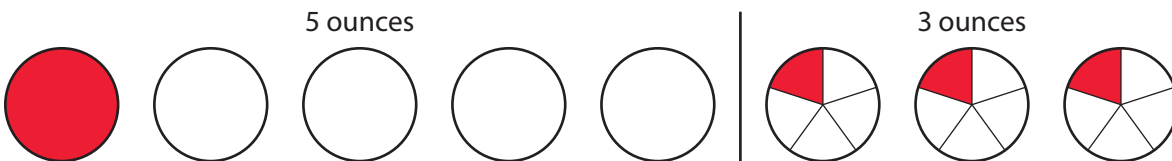
Suppose Mrs. Tatum wants to share 8 fluid ounces of paint equally among the 5 students. You can think about this quotient in two ways.

a. Think of each student getting  $\frac{1}{5}$  of each ounce. Shade  $\frac{1}{5}$  of each whole in the model below to show one student's share.



8 ounces  $\div$  5 =  $8 \times \dots = \dots$  ounces

b. Think of 8 ounces as 5 ounces + 3 ounces. Explain how the shaded part of the model below shows one student's share.



c. Write the quotient  $8 \div 5$  as a fraction and as a mixed number. ....

## 3 REFLECT

How would you write the fraction  $\frac{2}{5}$  as a division expression? Write a word problem that can be represented by your expression and by the fraction  $\frac{2}{5}$ .

.....

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# Prepare for Fractions as Division

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

Word	In My Own Words	Example
fraction		
division expression		
quotient		
remainder		

- 2 Write the fraction  $\frac{3}{4}$  as a division expression. ....  
How could you use multiplication to check your answer?

- 3 Solve the problem. Show your work.

**Mrs. Tatum needs to share 3 grams of glitter equally among 8 art students. How many grams of glitter will each student get?**



**Solution** .....

- 4 Check your answer. Show your work.





# Develop Fractions as Division



Read and try to solve the problem below.

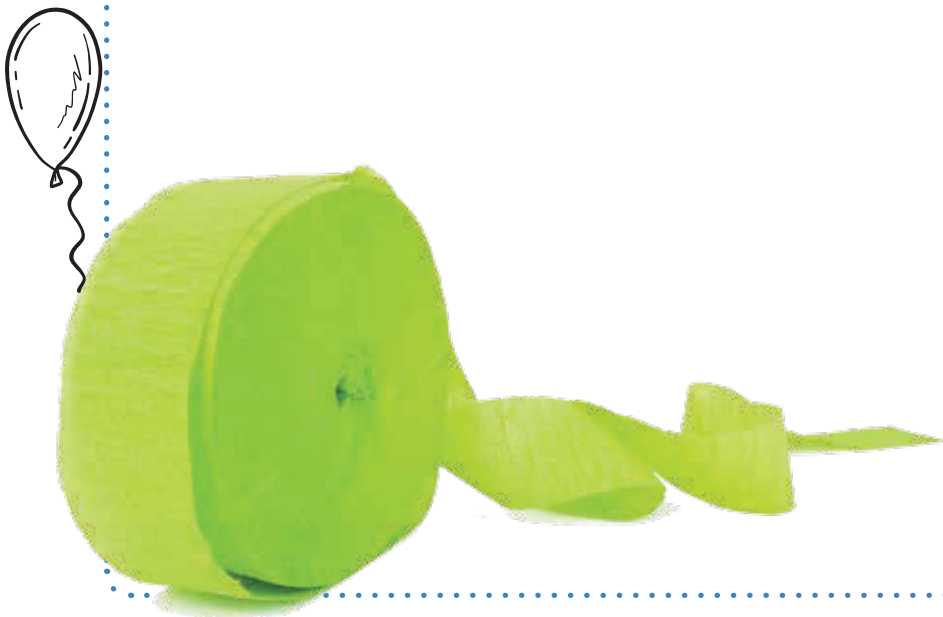
Jared, Monica, and Heather have 5 hallways to decorate for the student council. If they share the work equally, how much will each student decorate?

## TRY IT



### Math Toolkit

- fraction circles or tiles
- fraction bars
- fraction models 
- tenths grids
- number lines 
- index cards



## DISCUSS IT

**Ask your partner:** Do you agree with me? Why or why not?

**Tell your partner:** I disagree with this part because ...

Explore different ways to understand fractions as quotients.

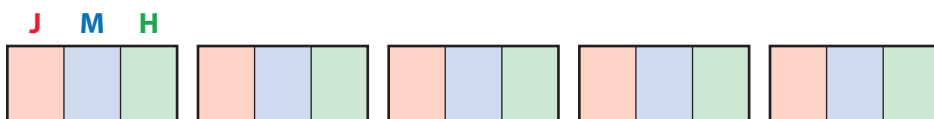
**Jared, Monica, and Heather have 5 hallways to decorate for the student council. If they share the work equally, how much will each student decorate?**

### PICTURE IT

You can use a fraction model to picture how the students divide up the work.

There are 5 hallways for 3 students to decorate, which is  $5 \div 3$ .

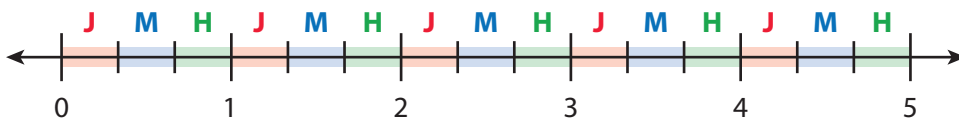
If they share the work equally, each student can decorate  $\frac{1}{3}$  of each hallway.



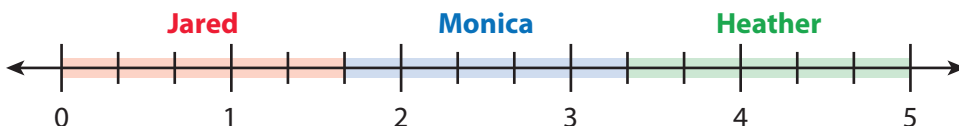
### MODEL IT

You can use a number line to model each student's share of the work.

The number line is numbered from 0 to 5 because there are 5 hallways. It is divided into thirds because each student can decorate one third of each hallway.



The thirds can be rearranged to show each student's share of the work.





## CONNECT IT

Now you will use the problem from the previous page to help you understand fractions as quotients.

1 How many thirds of a hallway are there to decorate in 5 hallways? ..... thirds

2 How many thirds of a hallway will each student decorate? ..... thirds

Write this as a fraction. .... of a hallway

3 Write a division equation that shows the quotient as a fraction. ....

Write a multiplication equation to check this equation. ....

4 How many whole hallways can each student decorate? .....

How many hallways remain after those are done? .....

How much of the 2 remaining hallways will each student decorate? .....

Write a mixed number to show how many hallways each student will decorate.

..... hallways

5 Calculate using remainder notation:  $5 \div 3 = \dots\dots\dots R \dots\dots\dots$

Compare this answer to the mixed number. How are they alike?

6 How does the bar in a fraction represent division?

## 7 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 finding fraction quotients? Explain.

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## APPLY IT

Use what you just learned to solve these problems.

- 8 Five friends are equally sharing 3 packs of football cards. How many packs of cards will each friend get? Use a visual model to support your answer.

**Solution** .....

- 9 Elena made 10 ounces of apple chips. She puts the same amount of apple chips into each of 4 containers. How many ounces of apple chips are in 1 container? Write a division expression to represent the problem and solve. Write the solution in remainder form and as a mixed number. Use a visual model to support your answer.



**Solution** .....

Does the remainder form or the mixed number form best answer the question? Explain.

- 10 Which expression is equivalent to  $\frac{12}{7}$ ?
- (A)  $12 - 7$                       (B)  $7 - 12$
- (C)  $12 \div 7$                       (D)  $7 \div 12$

# Practice Fractions as Division

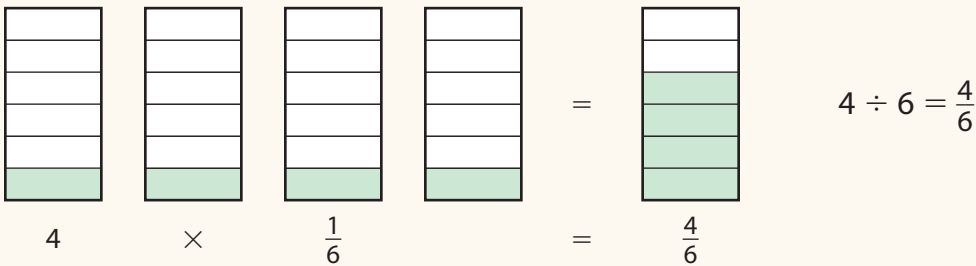
Study the Example showing whole-number division with a fraction quotient. Then solve problems 1–5.

## EXAMPLE

There are 4 packages of printer paper to be divided equally among 6 classrooms. How much paper will each classroom get?

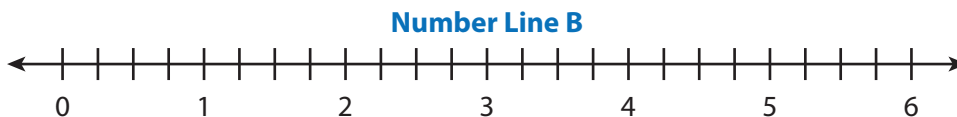
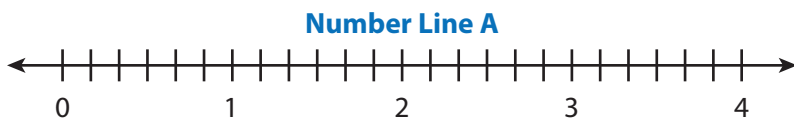
There are 4 packages for 6 classrooms to share, which is  $4 \div 6$ .

If you divide each package into sixths, each classroom would get one sixth of each package. So,  $\frac{1}{6}$  of each package from 4 packages is the same as  $\frac{4}{6}$  of a package.



Each classroom gets  $\frac{4}{6}$  of a package.

- 1 Circle the number line you would use to solve the problem in the Example.



- 2 Look at the Example. Suppose only 5 classrooms share 4 packages. How would the model in the Example change? How would the answer change?

- 3 Trish is taking care of the Han family's dogs. The Hans leave 7 cans of dog food for the 3 days they will be away. How much food will the dogs get each day if Trish feeds them an equal amount each day? Show your work. Write the answer in remainder form and as a mixed number.



**Solution** .....

Which best answers the question, the remainder form or the mixed number? Explain.

- 4 Raul plans to run 30 miles this week. He wants to run the same number of miles each day of the week. He says he will run  $\frac{7}{30}$  mile each day. Is he correct? Explain.

- 5 Gus makes 48 fluid ounces of spiced cider. If he serves an equal amount to each of 7 people, will each person get more than 1 cup of cider or less than 1 cup? (1 cup = 8 fluid ounces) Show your work.

**Solution** .....

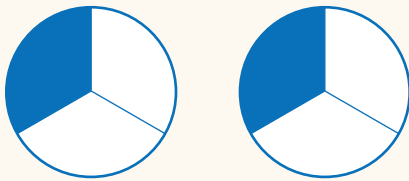
# Refine Fractions as Division

Complete the Example below. Then solve problems 1–9.

## EXAMPLE

Luke, Carter, and Ava have 2 quarts of juice. They want to share it equally. How many quarts of juice will each of them get?

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



$$\begin{aligned} 2 \div 3 &= 2 \times \frac{1}{3} \\ &= \frac{2}{3} \end{aligned}$$

**Solution** .....

2 quarts are shared equally by 3 friends, so I know that each friend will have less than 1 quart of juice. That means the quotient is a fraction.



## PAIR/SHARE

Model the problem for 3 quarts of juice divided equally among Luke, Carter, Ava, and Ava's little brother.

## APPLY IT

- Erica has 7 square feet of space in her rectangular garden to plant carrots, beans, peppers, and lettuce. Suppose she gives each vegetable an equal amount of space. How much space will each vegetable get? Show your work.

**Solution** .....

Each vegetable will get at least 1 square foot of garden space. How will the rest of the space be divided up?

## PAIR/SHARE

What are some ways you can check your solution?

- 2 Deon needs to make 36 pizza crusts. He has 120 ounces of dough and wants to use the same amount of dough for each crust. He weighs a portion of dough for 1 crust on a scale. The weight, in ounces, should fall between what two whole numbers? Show your work.

**Solution** .....

- 3 Jonas is doing a science experiment with his class. The teacher has 21 fluid ounces of pond water to share equally among 10 pairs of students. How much pond water will Jonas and his science partner receive?
- A  $\frac{10}{21}$  fluid ounce
  - B  $1\frac{1}{10}$  fluid ounces
  - C 2 fluid ounces
  - D  $\frac{21}{10}$  fluid ounces

Olivia chose A as the correct answer. How did she get that answer?

How many whole ounces of dough will each crust get? What will happen with the remaining ounces?



**PAIR/SHARE**

Create a different division story to represent  $\frac{120}{36}$ .

About how much water will each pair of students receive? Will it be more or less than 2 fluid ounces?



**PAIR/SHARE**

Does Olivia's answer make sense?



- 4 Teddy makes 32 fluid ounces of hot cocoa. He pours equal amounts of cocoa into 5 cups. The amount of hot cocoa in each cup will fall between which two amounts?
- (A) 3 and 4 fluid ounces  
 (B) 4 and 5 fluid ounces  
 (C) 5 and 6 fluid ounces  
 (D) 6 and 7 fluid ounces
- 5 Pierce swims 10 laps in a pool in 8 minutes. He spends the same amount of time on each lap. How much time does each lap take him?
- (A)  $\frac{2}{10}$  minute  
 (B)  $\frac{8}{10}$  minute  
 (C)  $\frac{10}{8}$  minutes  
 (D)  $1\frac{2}{8}$  minutes
- 6 Dani needs 8 equal sections from a board that is 13 feet long. Does the expression represent the largest possible length of 1 section of the board, in feet?



	Yes	No
$1\frac{5}{8}$	(A)	(B)
$\frac{8}{13}$	(C)	(D)
$\frac{13}{8}$	(E)	(F)
$8 \div 13$	(G)	(H)
$13 \times \frac{1}{8}$	(I)	(J)

- 7 Which situations can be represented by  $\frac{25}{9}$ ?
- Ⓐ Melanie equally shares 25 yards of paper to make 9 banners.
  - Ⓑ Quill gives away 9 baseball cards from a pack of 25 cards.
  - Ⓒ George invites 25 kids and 9 adults to his birthday party.
  - Ⓓ Becca makes 9 rows with 25 buttons each.
  - Ⓔ Joe makes 9 equal servings from a 25-ounce bag of peanuts.
- 8 Paco is trying to explain to his friend that  $7 \div 2 = \frac{7}{2}$ .

**Part A** Draw a model or number line showing  $7 \div 2 = \frac{7}{2}$ .

**Part B** Explain the equivalence of  $7 \div 2$  and  $\frac{7}{2}$  using words.

## 9 MATH JOURNAL

Write a division word problem that can be represented by the expression  $12 \div 5$ . Then explain how to solve your problem.



**SELF CHECK** Go back to the Unit 3 Opener and see what you can check off.