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## Unit 4, Lesson 2: Meanings of Division

Let's explore ways to think about division.

### 2.1: A Division Expression

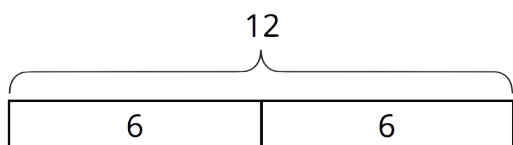
Here is an expression:  $20 \div 4$ .

What are some ways to think about this expression? Describe at least two meanings you think it could have.

### 2.2: Bags of Almonds

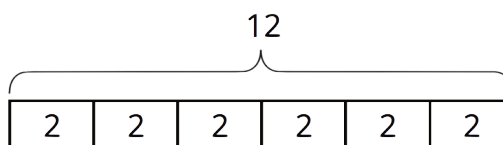
A baker has 12 pounds of almonds. She puts them in bags, so that each bag has the same weight.

- Clare and Tyler drew diagrams and wrote equations to show how they were thinking about  $12 \div 6$ .



$$\underline{\quad} \cdot 6 = 12$$

Clare's diagram and equation



$$6 \cdot \underline{\quad} = 12$$

Tyler's diagram and equation

How do you think Clare and Tyler thought about  $12 \div 6$ ? Explain what each diagram and each part of each equation (especially the missing number) might mean in the context of the bags of almonds.

Pause here for a class discussion.

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2. Explain what each division expression could mean in the context of the bags of almonds. Then draw a diagram and write a multiplication equation to show how you are thinking about the expression.

a.  $12 \div 4$

b.  $12 \div 2$

c.  $12 \div \frac{1}{2}$

**Are you ready for more?**

A loaf of bread is cut into slices.

1. If each slice is  $\frac{1}{2}$  of a loaf, how many slices are there?
2. If each slice is  $\frac{1}{5}$  of a loaf, how many slices are there?
3. What happens to the number of slices as each slice gets smaller?
4. Interpret the meaning of dividing by 0 in the context of slicing bread.

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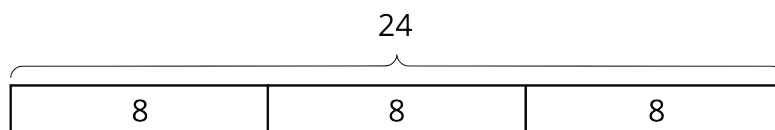
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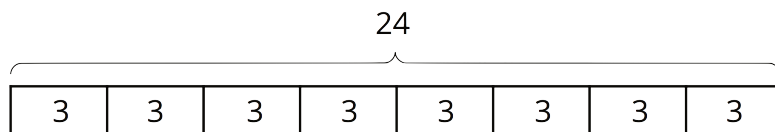
## Lesson 2 Summary

Suppose 24 bagels are being distributed into boxes. The expression  $24 \div 3$  could be understood in two ways:

- 24 bagels are distributed equally into 3 boxes, as represented by this diagram:



- 24 bagels are distributed into boxes, 3 bagels in each box, as represented by this diagram:



In both interpretations, the quotient is the same ( $24 \div 3 = 8$ ), but it has different meanings in each case. In the first case, the 8 represents the number of bagels in each of the 3 boxes. In the second, it represents the number of boxes that were formed with 3 bagels in each box.

These two ways of seeing division are related to how 3, 8, and 24 are related in a multiplication. Both  $3 \cdot 8$  and  $8 \cdot 3$  equal 24.

- $3 \cdot 8 = 24$  can be read as “3 groups of 8 make 24.”
- $8 \cdot 3 = 24$  can be read as “8 groups of 3 make 24.”

If 3 and 24 are the only numbers given, the multiplication equations would be:

$$3 \cdot ? = 24$$

$$? \cdot 3 = 24$$

In both cases, the division  $24 \div 3$  can be used to find the value of the “?” But now we see that it can be interpreted in more than one way, because the “?” can refer to *the size of a group* (as in “3 groups of what number make 24?”), or to *the number of groups* (as in “How many groups of 3 make 24?”).

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1. Twenty pounds of strawberries are being shared equally by a group of friends. The equation  $20 \div 5 = 4$  represents the division of strawberries.

a. If the 5 represents the number of people, what does the 4 represent?

b. If the 5 represents the pounds of strawberries per person, what does the 4 represent?

2. A sixth-grade science club needs \$180 to pay for the tickets to a science museum. All tickets cost the same amount.

What could  $180 \div 15$  mean in this context? Describe two interpretations of the expression. Then, find the quotient and explain what it means in each interpretation.

3. Write a multiplication equation that corresponds to each division equation.

a.  $10 \div 5 = ?$

b.  $4.5 \div 3 = ?$

c.  $\frac{1}{2} \div 4 = ?$

4. Write a division or multiplication equation that represents each situation. Use a “?” for the unknown quantity.

a. 2.5 gallons of water are poured into 5 equally sized bottles. How much water is in each bottle?

b. A large bucket of 200 golf balls is divided into 4 smaller buckets. How many golf balls are in each small bucket?

c. Sixteen socks are put into pairs. How many pairs are there?

5. Find a value for  $a$  that makes each statement true.

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 a.  $a \div 6$  is greater than 1

 c.  $a \div 6$  is less than 1

 b.  $a \div 6$  is equal to 1

 d.  $a \div 6$  is equal to a whole number

(from Unit 4, Lesson 1)

6. Complete the table. Write each percentage as a percent of 1.

fraction	decimal	percentage
$\frac{1}{4}$	0.25	25% of 1
	0.1	
		75% of 1
$\frac{1}{5}$		
	1.5	
		140% of 1

(from Unit 3, Lesson 14)

7. Jada walks at a speed of 3 miles per hour. Elena walks at a speed of 2.8 miles per hour. If they both begin walking along a walking trail at the same time, how much farther will Jada walk after 3 hours? Explain your reasoning.

(from Unit 3, Lesson 8)