Unit 3, Lesson 2

Meanings of Division

Let's explore ways to think about division.

2.1 A Division Expression

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

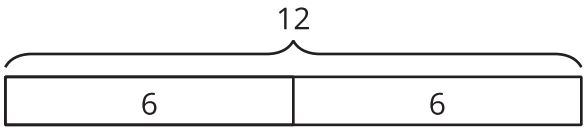
What are some ways to think about this expression?

Describe at least two meanings you think it could have or two questions it could be used to answer.

2.2 Bags of Clay

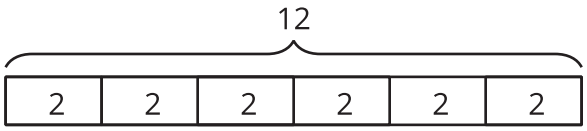
An art teacher has 12 pounds of clay. She puts them in bags, so that each bag has the same weight.

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



___ • 6 = 12

Clare's diagram and equation



6 • ___ = 12

Tyler's diagram and equation

1. How do you think Clare and Tyler thought about $12 \div 6$? Explain what the parts in each diagram and each equation (including the unknown number) could mean in the situation.

Pause here for a class discussion.

2. What could each division expression mean in the situation with the bags of clay? Draw a diagram and write a multiplication equation to show how you are thinking about each of these expressions.

   a. $12 \div 4$

   b. $12 \div 2$

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

Are you ready for more?

A rectangular block of clay is cut into slices.

1. If each slice is $\frac{1}{2}$ of a block, how many slices are there?

2. If each slice is $\frac{1}{5}$ of a block, how many slices are there?

3. What happens to the number of slices as each slice gets smaller?

4. What would dividing by 0 mean in this situation about slicing a block of clay?

2.3 Making Bubble Mixture

Mai is making a bubble mixture. The recipe says to add sugar to help the bubbles last longer.

1. To make one batch of mixture, 14 grams of sugar is needed. To get that amount, Mai uses 4 packets of sugar.

   a. In this situation, what does the value of $14 \div 4$ represent?

   b. Find the quotient. Show your reasoning. If you get stuck, consider drawing a diagram

2. Mai needs 26 fl oz of water to make a larger amount of the mixture. The only measuring tool she has is a 4-fl oz scoop. How many scoops will it take to measure 26 fl oz of water?

   a. Will the answer be more than 1 or less than 1?

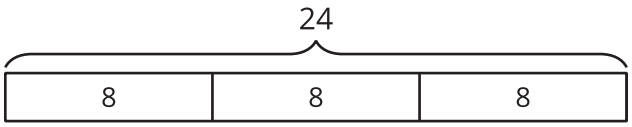
   b. Write a multiplication equation and a division equation that represent this situation. Use "?" to represent the unknown quantity.

   c. Find the unknown quantity. If you get stuck, consider drawing a diagram.

Lesson 2 Summary

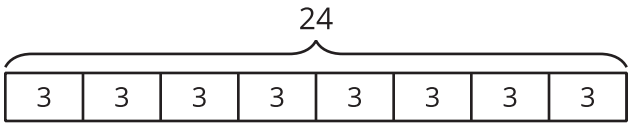
Suppose 24 books are being distributed into boxes. The expression $24 \div 3$ can be understood in two ways:

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



  In this case, the quotient, 8, is the number of books in each box.

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



  In this case, the quotient, 8, is the number of boxes used.

These two ways of seeing division are connected to the way 3, 8, and 24 are related by multiplication.

- $3 \cdot 8 = 24$ 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 unknown value, and the "?" can mean one of two things:

- The size of a group (as in "3 groups of what number make 24?")
- The number of groups (as in "How many groups of 3 make 24?")