Unit 4, Lesson 5

How Many Groups? (Part 2)

Let's use blocks and diagrams to understand more about division with fractions.

5.1 Reasoning with Fraction Strips

Write a fraction or whole number as an answer for each question. If you get stuck, use the fraction strips. Be prepared to share your reasoning.

1. How many $\frac{1}{2}$s are in 2?

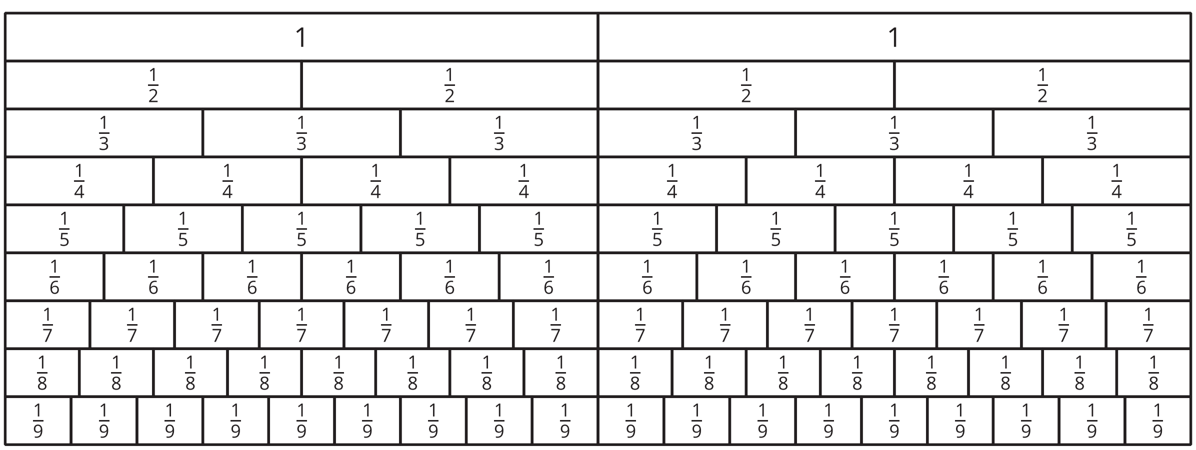
2. How many $\frac{1}{5}$s are in 3?

3. How many $\frac{1}{8}$s are in $1\frac{1}{4}$?

4. $1 \div \frac{2}{6} = ?$

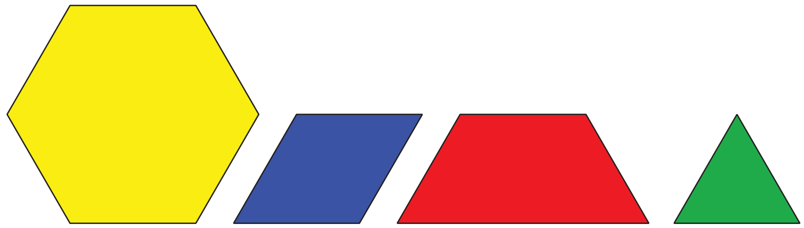
5. $2 \div \frac{2}{9} = ?$

6. $4 \div \frac{2}{10} = ?$



5.2 More Reasoning with Pattern Blocks

Your teacher will give you pattern blocks. Use them to answer the questions.



1. If the trapezoid represents 1 whole, what does each of the other shapes represent? Be prepared to show or explain your reasoning.
   a. 1 triangle
   b. 1 rhombus
   c. 1 hexagon

2. Use pattern blocks to represent each multiplication equation. Use the trapezoid to represent 1 whole. Sketch or trace the blocks to record your representation.
   a. $3 \cdot \frac{1}{3} = 1$
   b. $3 \cdot \frac{2}{3} = 2$

3. Diego and Jada were asked "How many rhombuses are in a trapezoid?"

   - Diego says, "$1\frac{1}{3}$. If I put 1 rhombus on a trapezoid, the leftover shape is a triangle, which is $\frac{1}{3}$ of the trapezoid."
   - Jada says, "I think it's $1\frac{1}{2}$. Since we want to find out 'How many rhombuses . . . ?' we should compare the leftover triangle to a rhombus. A triangle is $\frac{1}{2}$ of a rhombus."

   Do you agree with either of them? Explain or show your reasoning.

4. Select **all** the equations that can be used to answer the question: "How many rhombuses are in a trapezoid?"

   - $\frac{2}{3} \div ? = 1$
   - $1 \div \frac{2}{3} = ?$
   - $? \div \frac{2}{3} = 1$
   - $? \cdot \frac{2}{3} = 1$
   - $1 \cdot \frac{2}{3} = ?$

5.3 Drawing Diagrams to Show Equal-size Groups

For each situation:

- Draw a diagram to represent the situation.
- Answer the question.
- Write a multiplication equation or a division equation for the relationship between the quantities.

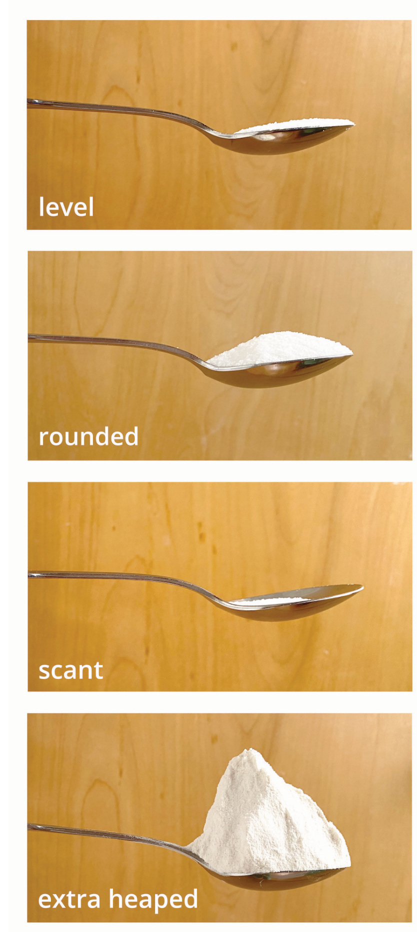
1. The water hose fills a bucket at $\frac{1}{3}$ gallon per minute. How many minutes does it take to fill a 2-gallon bucket?

2. The distance around a park is $\frac{3}{2}$ miles. Noah rode his bicycle around the park for a total of 3 miles. How many times around the park did he ride?

3. You need $\frac{3}{4}$ yard of ribbon for one gift box. You have 3 yards of ribbon. How many gift boxes do you have ribbon for?

Are you ready for more?

There are 48 level teaspoons in 1 cup. Estimate:



1. How many rounded teaspoons are in 1 cup?

2. How many scant teaspoons are in 1 cup?

3. How many extra-heaped teaspoons are in 1 cup?

Lesson 5 Summary

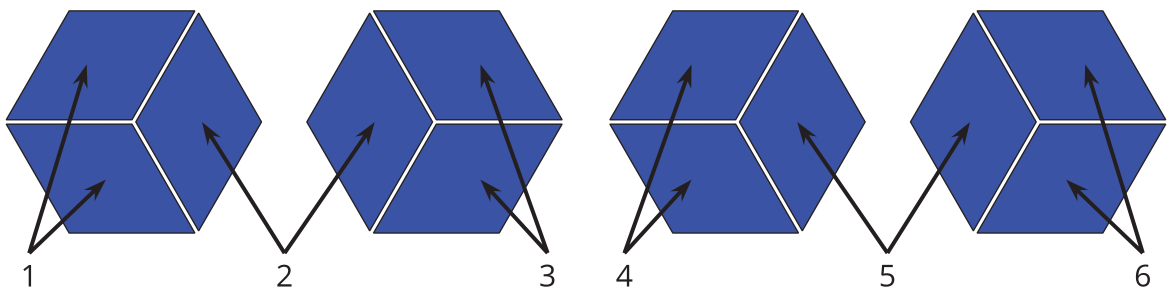
Suppose one batch of cookies requires $\frac{2}{3}$ cup of flour. How many batches can be made with 4 cups of flour?

We can think of the question as being: "How many $\frac{2}{3}$s are in 4?" and represent it using multiplication and division equations.

$$? \cdot \frac{2}{3} = 4$$

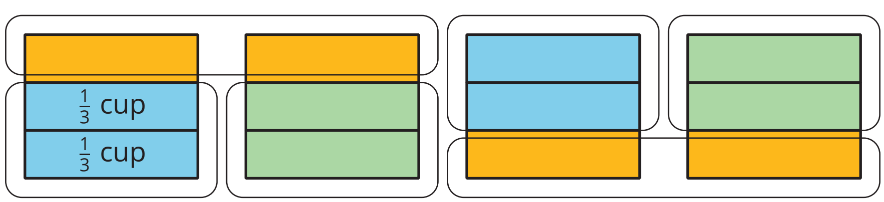
$$4 \div \frac{2}{3} = ?$$

Let's use pattern blocks to visualize the situation and say that a hexagon is 1 whole.



Since 3 rhombuses make a hexagon, 1 rhombus represents $\frac{1}{3}$, and 2 rhombuses represent $\frac{2}{3}$. We can see that 6 pairs of rhombuses make 4 hexagons, so there are 6 groups of $\frac{2}{3}$ in 4.

Other kinds of diagrams can also help us reason about equal-size groups involving fractions. This example shows how we might reason about the same question asked earlier: "How many $\frac{2}{3}$-cup are in 4 cups?"



We can see each "cup" partitioned into thirds, and that there are 6 groups of $\frac{2}{3}$-cup in 4 cups. In both diagrams, we see that the unknown value (or the "?" in the equations) is 6. So we can now write:

$$6 \cdot \frac{2}{3} = 4$$

$$4 \div \frac{2}{3} = 6$$

