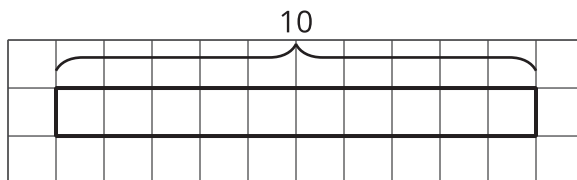


# How Many Groups?

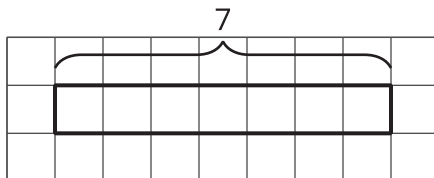
Let's draw tape diagrams to think about division with fractions.

## 3.1 How Many of These in That?

We can think of the division expression  $10 \div 2\frac{1}{2}$  as the question: "How many groups of  $2\frac{1}{2}$  are in 10?" Complete the tape diagram to represent this question. Then find the answer.



Complete the tape diagram to represent the question: "How many groups of 2 are in 7?" Then find the answer.



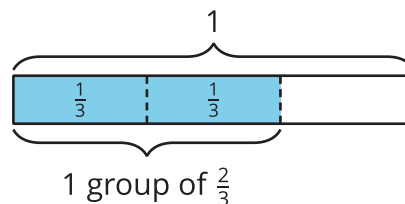
## 3.2

# Representing Groups of Fractions with Tape Diagrams

To make sense of the question “How many  $\frac{2}{3}$ s are in 1?” Andre wrote equations and drew a tape diagram.

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

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



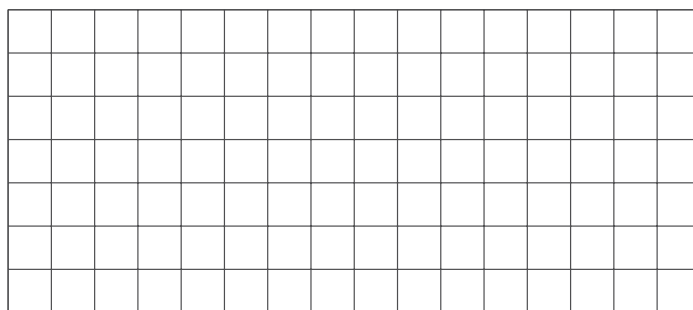
1. Andre isn't sure how to deal with the remainder.

- Diego says, “The answer is  $1\frac{1}{3}$  because the remainder is  $\frac{1}{3}$  of the rectangle.”
- Jada says, “I think it's  $1\frac{1}{2}$ . Since we want to find out ‘how many  $\frac{2}{3}$ s’ there are, we should compare the leftover part to a group of  $\frac{2}{3}$ . The remainder is  $\frac{1}{2}$  of a group.”

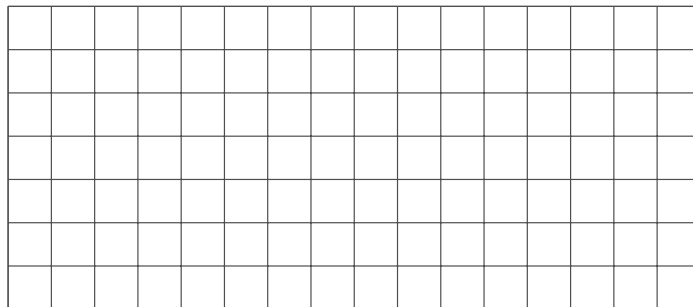
Do you agree with either of them? Explain or show your reasoning

2. Write a multiplication equation and a division equation for each question. Then draw a tape diagram and find the answer.

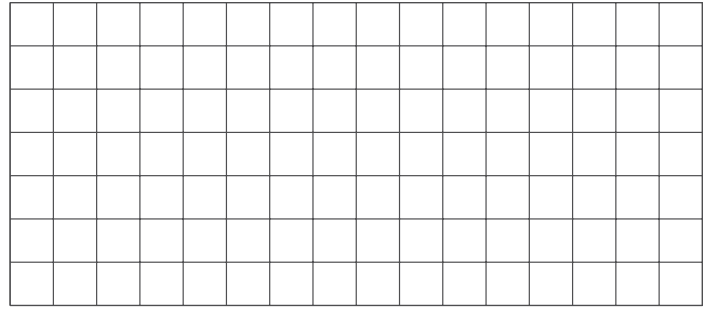
a. How many  $\frac{3}{4}$ s are in 1?



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



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



### 3.3

## Finding the Number of Groups

Write a multiplication equation or a division equation for each question, and then find the answer. Explain or show your reasoning.

1. How many groups of  $\frac{1}{2}$  pound are in  $2\frac{3}{4}$  pounds?
2. How many  $\frac{3}{8}$ -inch thick books make a stack that is 6 inches tall?



### Are you ready for more?

Write a story with a question that can be represented by the equation  $5 \div 1\frac{1}{2} = ?$ , and then find the answer. Show your reasoning.

## Lesson 3 Summary

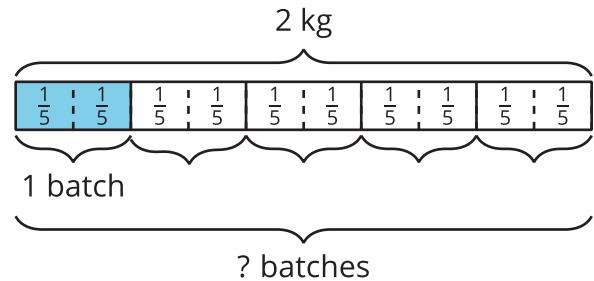
One batch of a recipe calls for  $\frac{2}{5}$  kg of flour. If a baker used 2 kg of flour, how many batches did she make?

We can think of the question as “How many groups of  $\frac{2}{5}$  make 2 kg?” and represent it with the equations:

$$? \cdot \frac{2}{5} = 2$$

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

To help us make sense of the question, we can draw a tape diagram. This diagram shows 2 whole kilograms, with each kilogram partitioned into fifths.



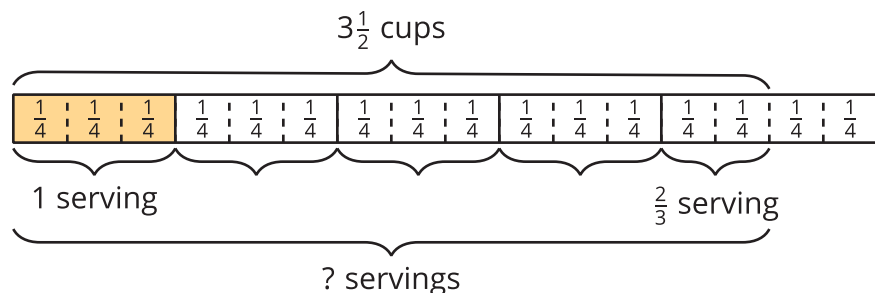
We can see that there are 5 groups of  $\frac{2}{5}$  in 2. Multiplying 5 and  $\frac{2}{5}$  gives  $\frac{10}{5}$  or 2, so  $2 \div \frac{2}{5}$  is 5.

Sometimes the number of groups or the result of dividing is not a whole number. Suppose one serving of rice is  $\frac{3}{4}$  cup. How many servings are there in  $3\frac{1}{2}$  cups?

Here are two equations and a diagram that represent the situation:

$$? \cdot \frac{3}{4} = 3\frac{1}{2}$$

$$3\frac{1}{2} \div \frac{3}{4} = ?$$



The diagram shows 4 full groups of  $\frac{3}{4}$ , plus 2 extra  $\frac{1}{4}$ s, which make  $\frac{2}{3}$  of a group. So  $3\frac{1}{2} \div \frac{3}{4}$  is  $4\frac{2}{3}$ . We can check this quotient by multiplying  $4\frac{2}{3}$  and  $\frac{3}{4}$ .

$$4\frac{2}{3} \cdot \frac{3}{4} = \frac{14}{3} \cdot \frac{3}{4}, \text{ and } \frac{14}{3} \cdot \frac{3}{4} = \frac{14}{4}, \text{ which is } 3\frac{2}{4} \text{ or } 3\frac{1}{2}.$$