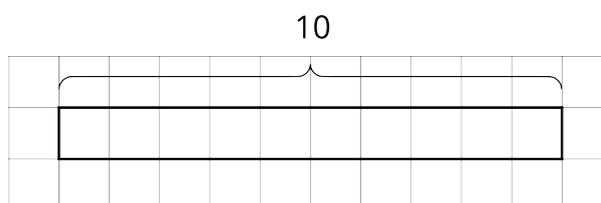


## Lesson 3: How Many Groups?

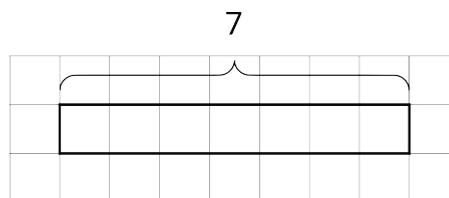
Let's draw tape diagrams to think about division with fractions.

### 3.1: How Many of These in That?

1. 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.



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

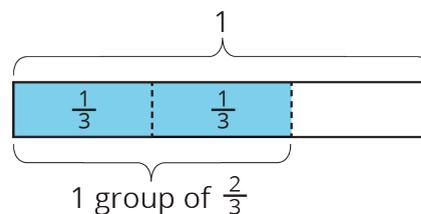


### 3.2: Representing Groups of Fractions with Tape Diagrams

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 wasn'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 the answer is  $1\frac{1}{2}$ . 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 Number of Groups

1. Write a multiplication equation or a division equation for each question. Then, find the answer and explain or show your reasoning.

a. How many  $\frac{3}{8}$ -inch thick books make a stack that is 6 inches tall?

b. How many groups of  $\frac{1}{2}$  pound are in  $2\frac{3}{4}$  pounds?

2. Write a question that can be represented by the division equation  $5 \div 1\frac{1}{2} = ?$ . Then, find the answer and explain or show your reasoning.

### Lesson 3 Summary

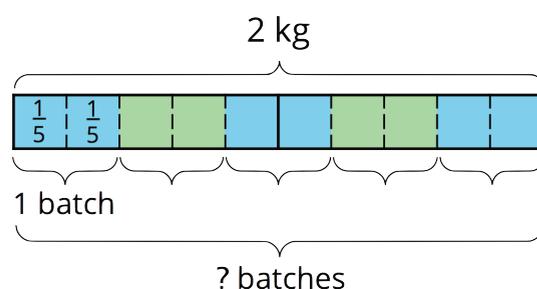
A baker used 2 kilograms of flour to make several batches of a pastry recipe. The recipe called for  $\frac{2}{5}$  kilogram of flour per batch. How many batches did she make?

We can think of the question as: “How many groups of  $\frac{2}{5}$  kilogram make 2 kilograms?” and represent that question 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.



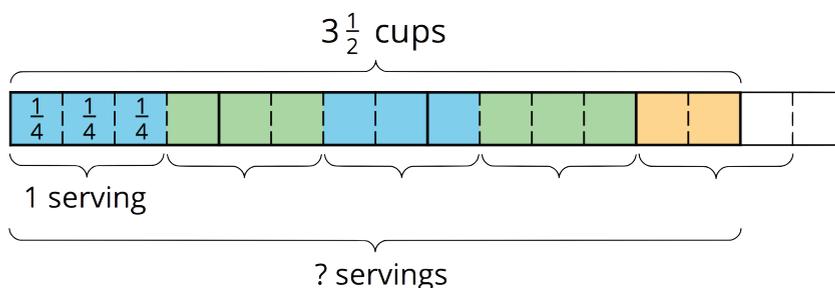
We can see there are 5 groups of  $\frac{2}{5}$  in 2. Multiplying 5 and  $\frac{2}{5}$  allows us to check this answer:  $5 \cdot \frac{2}{5} = \frac{10}{5}$  and  $\frac{10}{5} = 2$ , so the answer is correct.

Notice the number of groups that result from  $2 \div \frac{2}{5}$  is a whole number. Sometimes the number of groups we find from dividing may not be a whole number. Here is an example:

Suppose one serving of rice is  $\frac{3}{4}$  cup. How many servings are there in  $3\frac{1}{2}$  cups?

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

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



Looking at the diagram, we can see there are 4 full groups of  $\frac{3}{4}$ , plus 2 fourths. If 3 fourths make a whole group, then 2 fourths make  $\frac{2}{3}$  of a group. So the number of servings (the “?” in each equation) is  $4\frac{2}{3}$ . We can check this by multiplying  $4\frac{2}{3}$  and  $\frac{3}{4}$ .

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