

What Fraction of a Group?

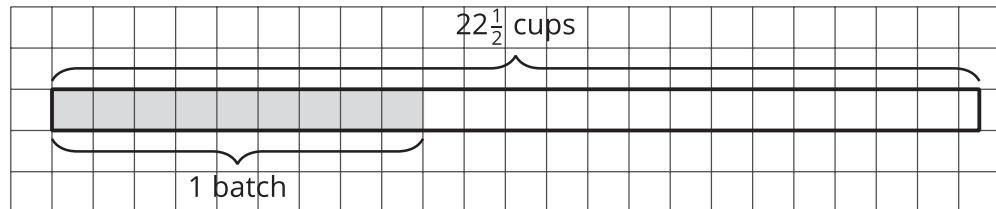
Let's think about dividing things into groups when we can't even make one whole group.

4.1

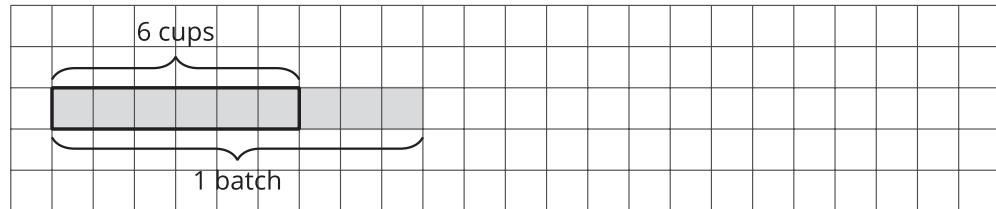
Notice and Wonder: Cups and Days

What do you notice? What do you wonder?

Tuesday



Thursday



4.2 Fractional Batches of Soup

One batch of a soup recipe uses 9 cups of milk. A chef makes different amounts of soup on different days. Here are the amounts of milk she used:

- Monday: 12 cups
- Thursday: 6 cups
- Tuesday: $22\frac{1}{2}$ cups
- Friday: $7\frac{1}{2}$ cups

For each question:

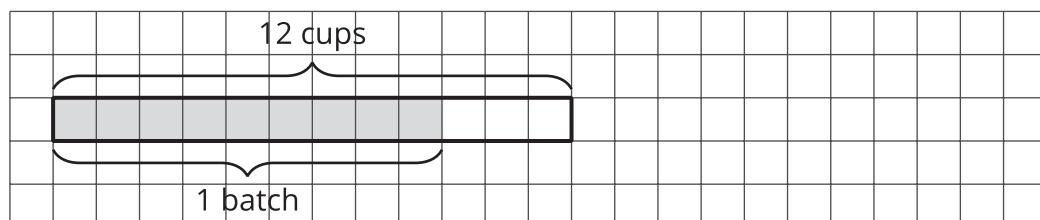
- A. Write a multiplication equation and a division equation that represent it. Use the "?" symbol for the unknown value.
- B. Answer the question. Use the partially started tape diagram to show your reasoning. The shaded region represents the cups of milk in 1 batch.

1. How many batches of soup did she make on Monday?

a. Multiplication equation:

Division equation:

b. Answer:

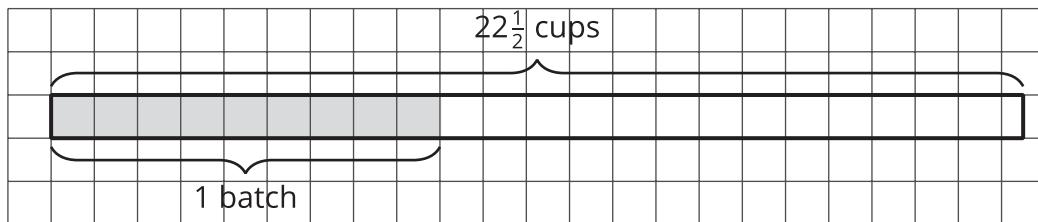


2. How many batches of soup did she make on Tuesday?

a. Multiplication equation:

Division equation:

b. Answer:

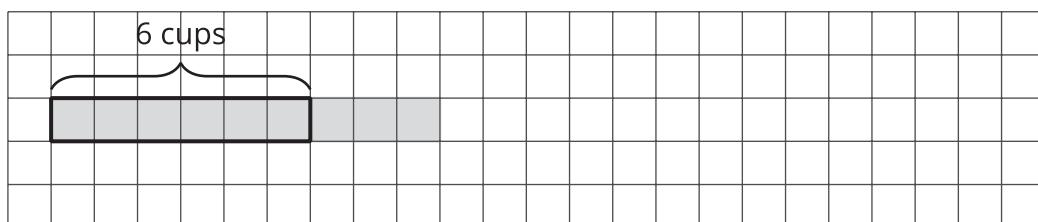


3. What fraction of a batch of soup did she make on Thursday?

a. Multiplication equation:

Division equation:

b. Answer:

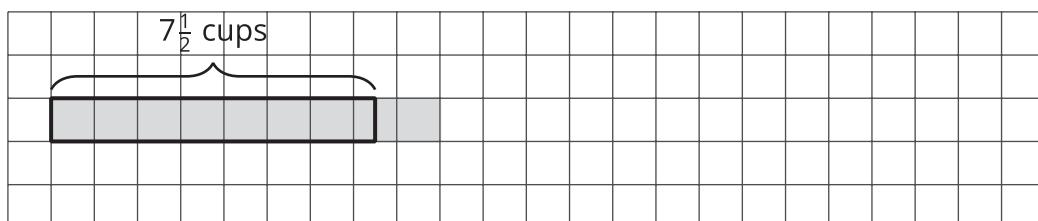


4. What fraction of a batch of soup did she make on Friday?

a. Multiplication equation:

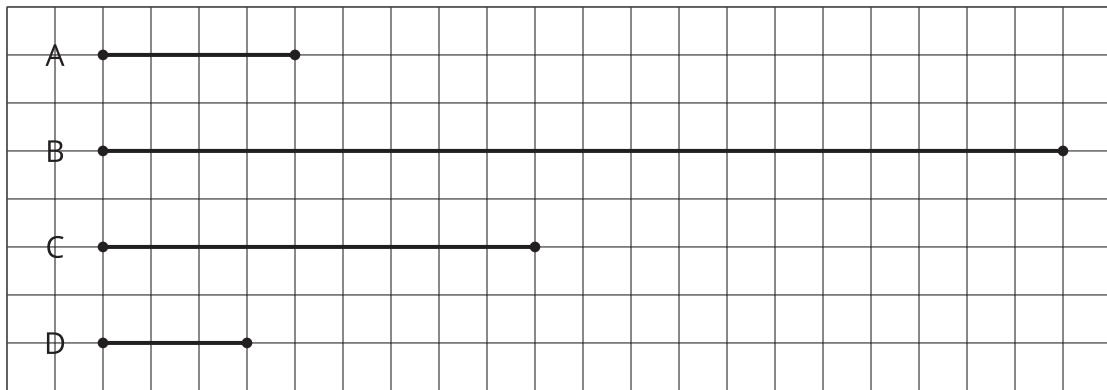
Division equation:

b. Answer:



4.3 Fractions of Ropes

Here is a diagram that shows four ropes of different lengths.



Complete each sentence comparing the ropes' lengths. Then write a multiplication equation and a division equation for each comparison.

statement	multiplication equation	division equation
Rope B is _____ times as long as Rope A.		
Rope C is _____ times as long as Rope A.		
Rope D is _____ times as long as Rope A.		
Rope D is _____ times as long as Rope C.		

4.4 Not Quite One Group

For each question, write a multiplication equation and a division equation. Then answer the question. You can draw a tape diagram if you find it helpful.

1. What fraction of 9 is 3?

a. Multiplication equation:

Division equation:

b. Answer:

2. What fraction of 5 is $\frac{1}{2}$?

a. Multiplication equation:

Division equation:

b. Answer:

Lesson 4 Summary

It is natural to think about groups when we have more than one group, but we can also have a fraction of a group.

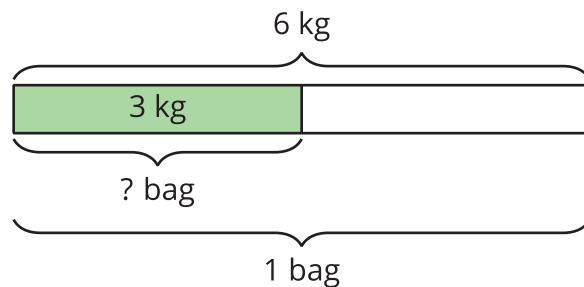
Sometimes an amount is less than the size of 1 group, and we want to know what fraction of a group that amount is.

Suppose a full bag of flour weighs 6 kg. A chef used 3 kg of flour. What fraction of a full bag was used? In other words, what fraction of 6 kg is 3 kg?

We can still write equations and draw a diagram to represent the situation.

$$? \cdot 6 = 3$$

$$3 \div 6 = ?$$



We can see from the diagram that 3 is $\frac{1}{2}$ of 6, so $3 \div 6 = \frac{1}{2}$. We can check this quotient by multiplying: $\frac{1}{2} \cdot 6 = 3$.

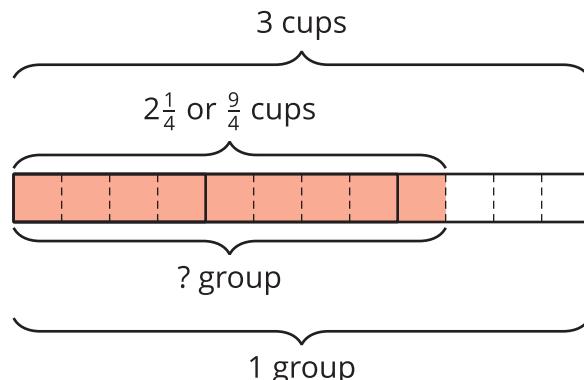
In *any* situation where we want to know what fraction one number is of another number, we can write a multiplication equation and a division equation to help us find the answer.

For example, "What fraction of 3 is $2\frac{1}{4}$?" can be expressed as:

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

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

The value of $2\frac{1}{4} \div 3$ is also the answer to the original question.



We can use a diagram to reason that there are 12 fourths in 3 and 9 fourths in $2\frac{1}{4}$, so $2\frac{1}{4}$ is $\frac{9}{12}$, or $\frac{3}{4}$, of 3. If we multiply $\frac{3}{4}$ and 3, we get $2\frac{1}{4}$.