Unit 4, Lesson 7

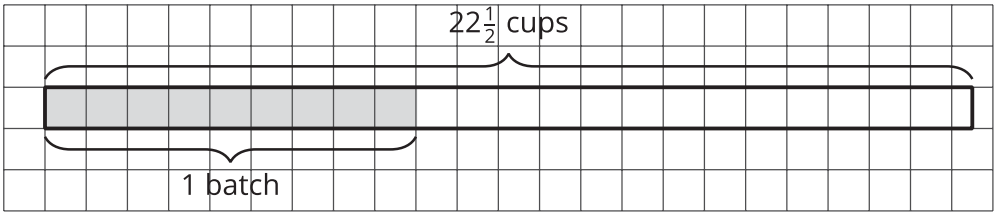
What Fraction of a Group?

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

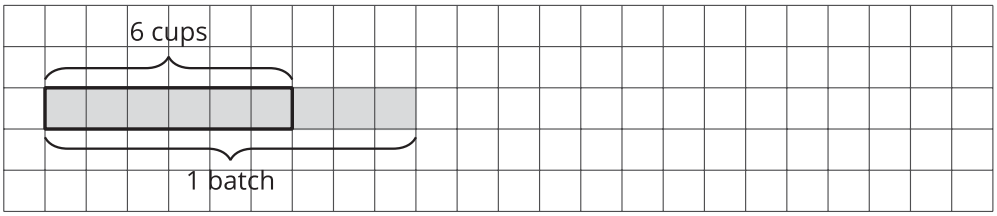
7.1 Notice and Wonder: Cups and Days

What do you notice? What do you wonder?

Tuesday



Thursday



7.2 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:

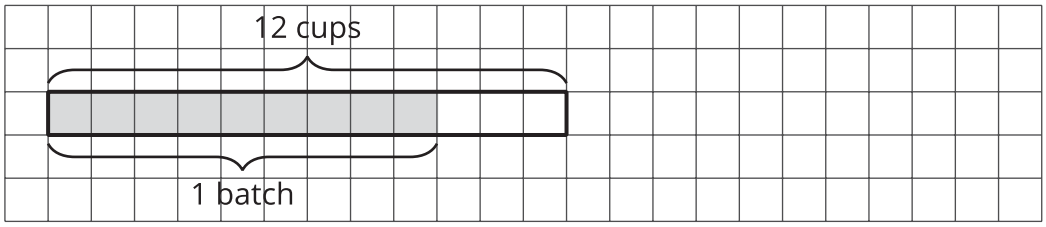
A. Write a multiplication equation and a division equation that represent it. Use the "?" symbol for the unknown value.

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:

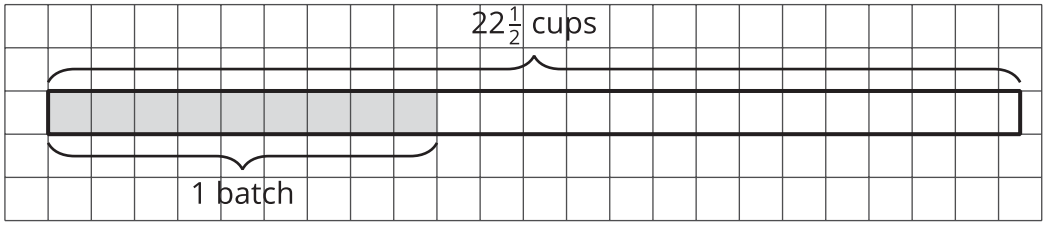
   b. Answer:



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

   a. Multiplication equation: Division equation:

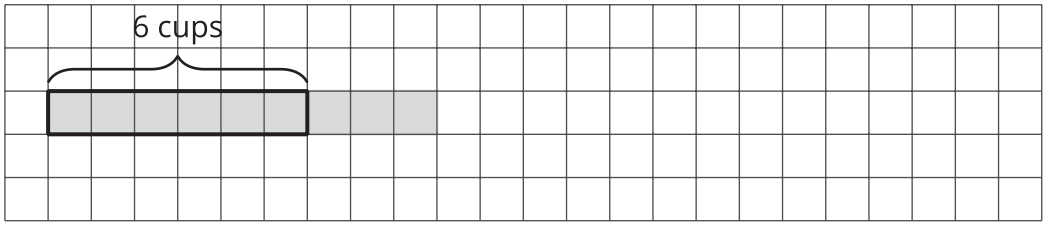
   b. Answer:



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

   a. Multiplication equation: Division equation:

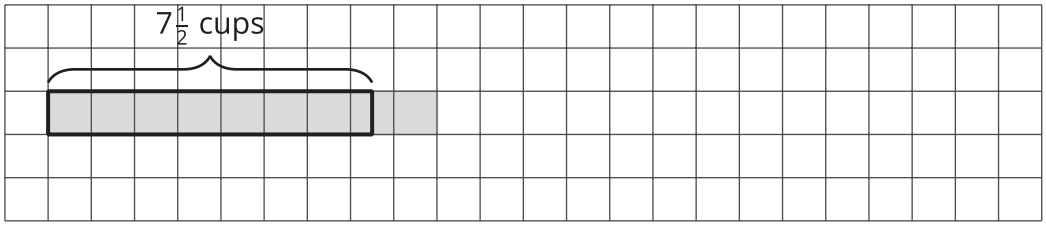
   b. Answer:



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

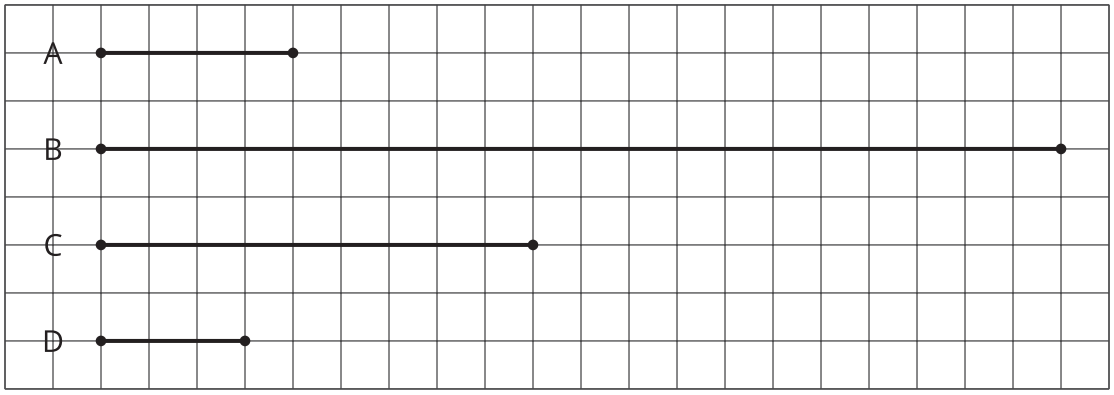
   a. Multiplication equation: Division equation:

   b. Answer:



7.3 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.		

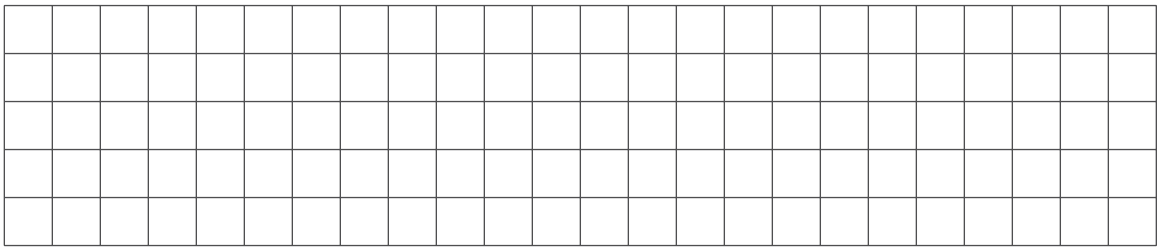
7.4 Not Quite One Group

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:

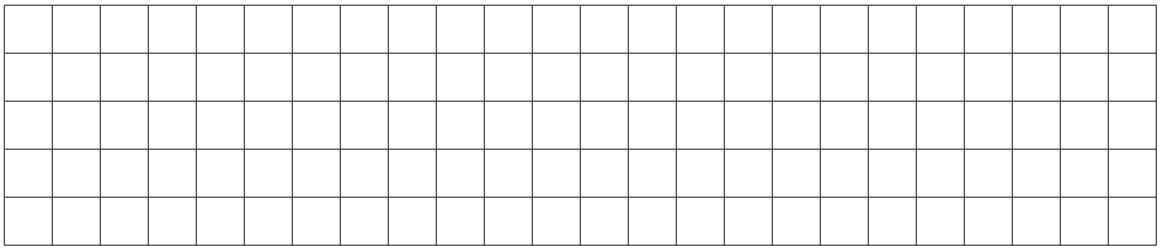
   b. Answer:



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

   a. Multiplication equation: Division equation:

   b. Answer:



Lesson 7 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.

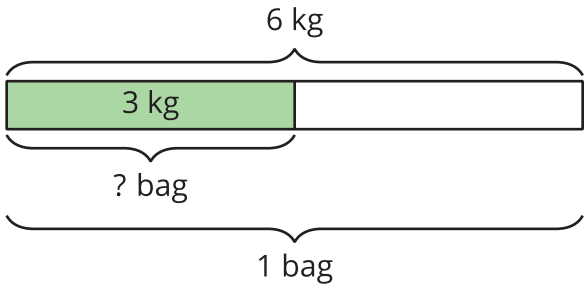
Sometimes an amount is less than the size of 1 group, and we want to know what fraction of a group that amount is.

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: $\frac{1}{2} \cdot 6 = 3$.

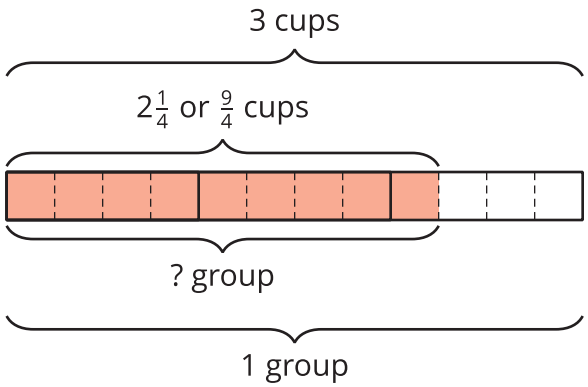
In *any* situation where we want to know what fraction one number is of another number, we can write a multiplication equation and a division equation to help us find the answer.

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 $2\frac{1}{4}$.