

Lesson 7: What Fraction of a Group?

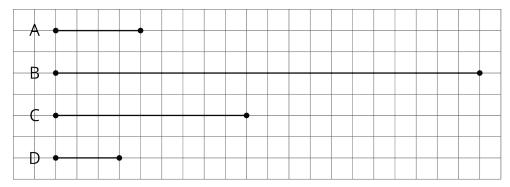
Let's think about dividing things into groups when we can't even make one whole group.

7.1: Estimating a Fraction of a Number

- 1. Estimate the quantities:
 - a. What is $\frac{1}{3}$ of 7?
 - b. What is $\frac{4}{5}$ of $9\frac{2}{3}$?
 - c. What is $2\frac{4}{7}$ of $10\frac{1}{9}$?
- 2. Write a multiplication expression for each of the previous questions.

7.2: Fractions of Ropes

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



- 1. Complete each sentence comparing the lengths of the ropes. Then, use the measurements shown on the grid to write a multiplication equation and a division equation for each comparison.
 - a. Rope B is _____ times as long as Rope A.
 - b. Rope C is _____ times as long as Rope A.
 - c. Rope D is _____ times as long as Rope A.



2. Each equation can be used to answer a question about Ropes C and D. What could each question be?

a.
$$? \cdot 3 = 9$$
 and $9 \div 3 = ?$

b.
$$? \cdot 9 = 3 \text{ and } 3 \div 9 = ?$$

7.3: Fractional Batches of Ice Cream

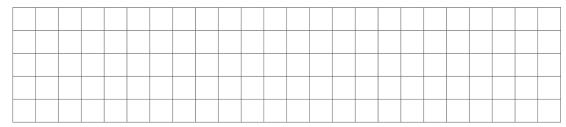
One batch of an ice cream recipe uses 9 cups of milk. A chef makes different amounts of ice cream on different days. Here are the amounts of milk she used:

Monday: 12 cups

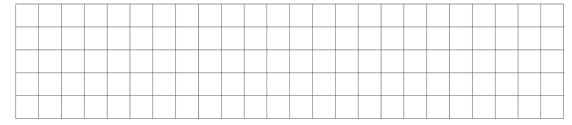
• Thursday: 6 cups

• Tuesday: $22\frac{1}{2}$ cups

- Friday: $7\frac{1}{2}$ cups
- 1. How many batches of ice cream did she make on these days? For each day, write a division equation, draw a tape diagram, and find the answer.
 - a. Monday



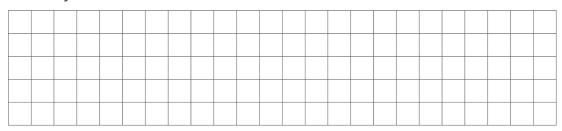
b. Tuesday



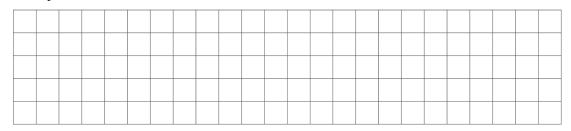


2. What fraction of a batch of ice cream did she make on these days? For each day, write a division equation, draw a tape diagram, and find the answer.

a. Thursday

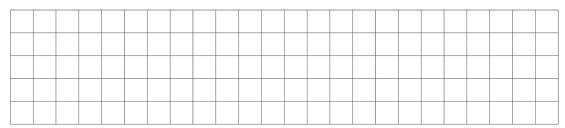


b. Friday

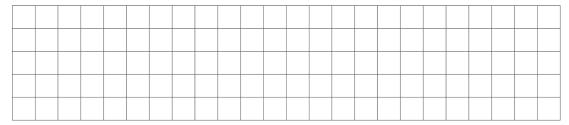


3. For each question, write a division equation, draw a tape diagram, and find the answer.

a. What fraction of 9 is 3?



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

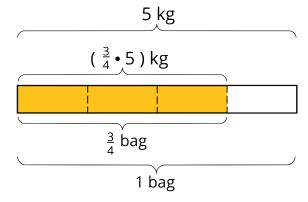




Lesson 7 Summary

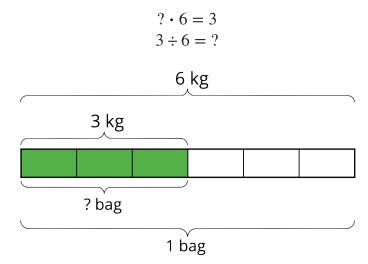
It is natural to think about groups when we have more than one group, but we can also have a *fraction of a group*.

To find the amount in a fraction of a group, we can multiply the fraction by the amount in the whole group. If a bag of rice weighs 5 kg, $\frac{3}{4}$ of a bag would weigh $(\frac{3}{4} \cdot 5)$ kg.



Sometimes we need to find what fraction of a group an 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?

This question can be represented by a multiplication equation and a division equation, as well as by a diagram.



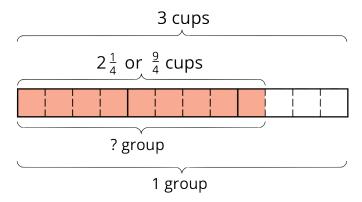
We can see from the diagram that 3 is $\frac{1}{2}$ of 6, and we can check this answer by multiplying: $\frac{1}{2} \cdot 6 = 3$.



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

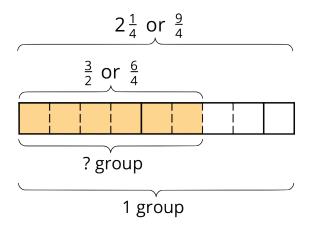
For example, "What fraction of 3 is $2\frac{1}{4}$?" can be expressed as $? \cdot 3 = 2\frac{1}{4}$, which can also be written as $2\frac{1}{4} \div 3 = ?$.

The answer to "What is $2\frac{1}{4} \div 3$?" is also the answer to the original question.



The diagram shows that 3 wholes contain 12 fourths, and $2\frac{1}{4}$ contains 9 fourths, so the answer to this question is $\frac{9}{12}$, which is equivalent to $\frac{3}{4}$.

We can use diagrams to help us solve other division problems that require finding a fraction of a group. For example, here is a diagram to help us answer the question: "What fraction of $\frac{9}{4}$ is $\frac{3}{2}$?," which can be written as $\frac{3}{2} \div \frac{9}{4} = ?$.



We can see that the quotient is $\frac{6}{9}$, which is equivalent to $\frac{2}{3}$. To check this, let's multiply. $\frac{2}{3} \cdot \frac{9}{4} = \frac{18}{12}$, and $\frac{18}{12}$ is, indeed, equal to $\frac{3}{2}$.