

Lesson 4: What Fraction of a Group?

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

4.1: Estimating a Fraction of a Number

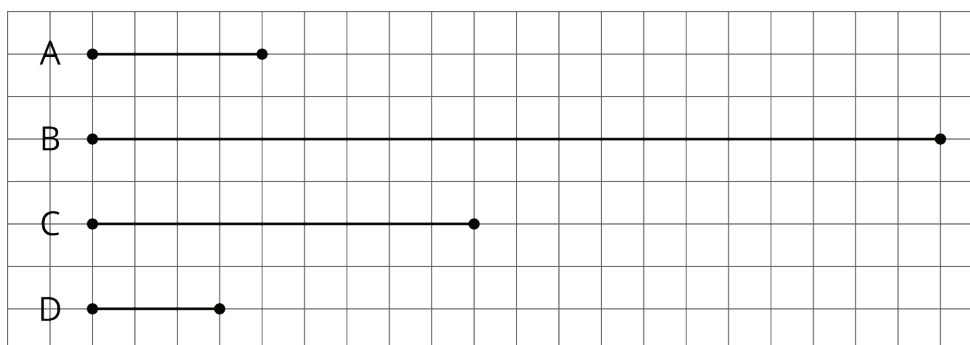
1. Estimate the quantities:

- What is $\frac{1}{3}$ of 7?
- What is $\frac{4}{5}$ of $9\frac{2}{3}$?
- What is $2\frac{4}{7}$ of $10\frac{1}{9}$?

2. Write a multiplication expression for each of the previous questions.

4.2: Fractions of Ropes

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



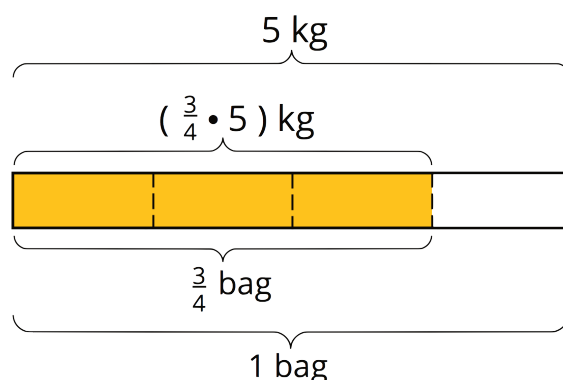
1. Complete each sentence comparing the lengths of the ropes. Then, use the measurements shown on the grid to write a multiplication equation and a division equation for each comparison.

- 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.

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*.

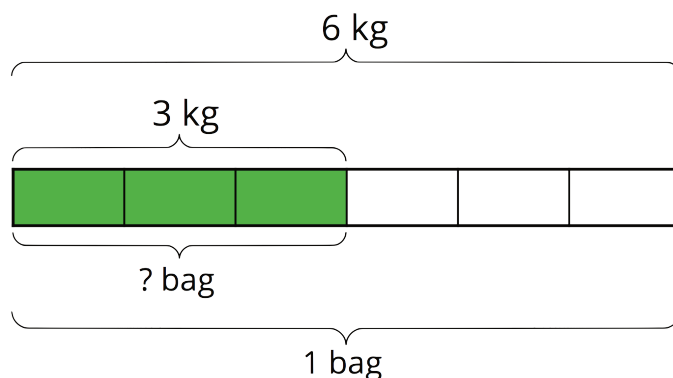
To find the amount in a fraction of a group, we can multiply the fraction by the amount in the whole group. If a bag of rice weighs 5 kg, $\frac{3}{4}$ of a bag would weigh $(\frac{3}{4} \cdot 5)$ kg.



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.

$$\begin{aligned} ? \cdot 6 &= 3 \\ 3 \div 6 &= ? \end{aligned}$$

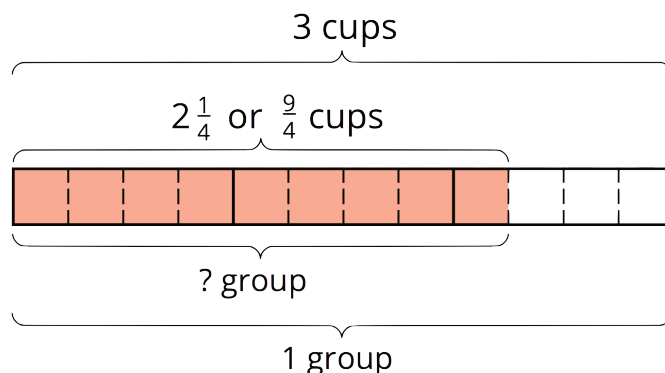


We can see from the diagram that 3 is $\frac{1}{2}$ of 6, and we can check this answer by multiplying:
 $\frac{1}{2} \cdot 6 = 3$.

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.

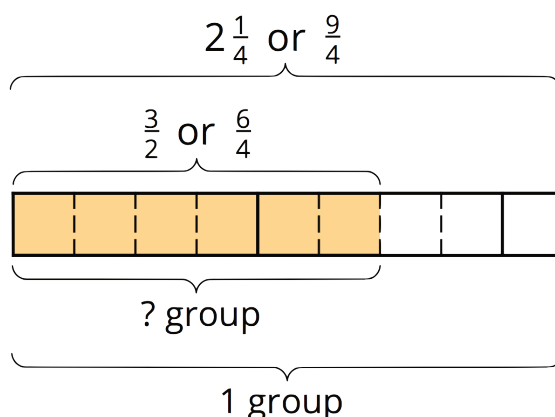
For example, “What fraction of 3 is $2\frac{1}{4}$?” can be expressed as $? \cdot 3 = 2\frac{1}{4}$, which can also be written as $2\frac{1}{4} \div 3 = ?$.

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 $\frac{3}{2}$.