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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: Estimating a Fraction of a Number

1. Estimate the following quantities:

2. Write a multiplication expression for each question.

a. What is $\frac{1}{3}$ of 7?

b. What is $\frac{4}{5}$ of $9\frac{2}{3}$?

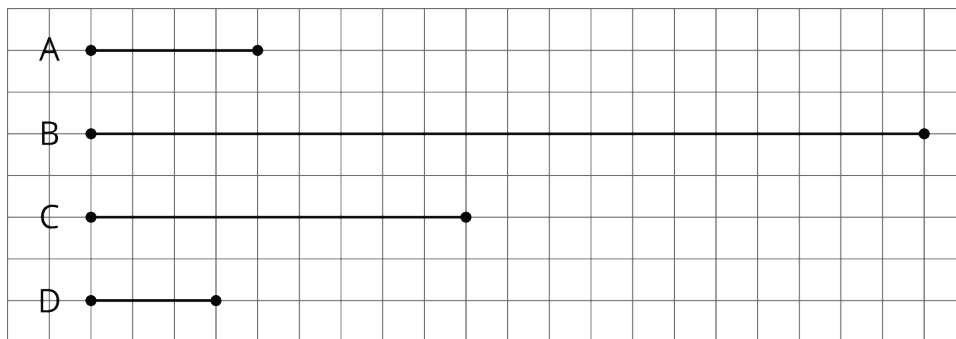
c. What is $2\frac{4}{7}$ of $10\frac{1}{9}$?

7.2: Fractions of Ropes

m.openup.org/1/6-4-7-2



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



1. Compare the lengths of Ropes B, C, and D to the length of Rope A, and complete each statement. Then use the measurements shown on the grid to write a multiplication equation and a division equation for each statement.

a. Rope B is _____ times as long as Rope A.

Multiplication equation:

Division equation:

b. Rope C is _____ times as long as Rope A.

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Multiplication equation:

Division equation:

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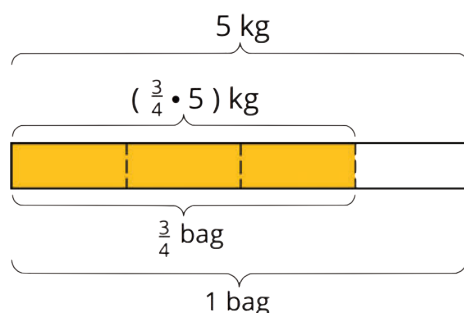
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Lesson 7 Summary

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.

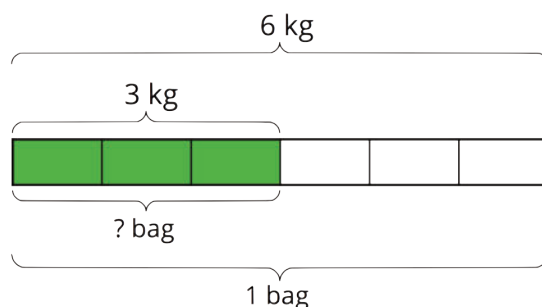


Sometimes we need to find what fraction of a group an amount is. Suppose a full bag of flour weighs 6 kg. A chef used 3 kg of flour. What fraction of a full bag was used? In other words, what fraction of 6 kg is 3 kg?

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

$$? \cdot 6 = 3$$

$$3 \div 6 = ?$$



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

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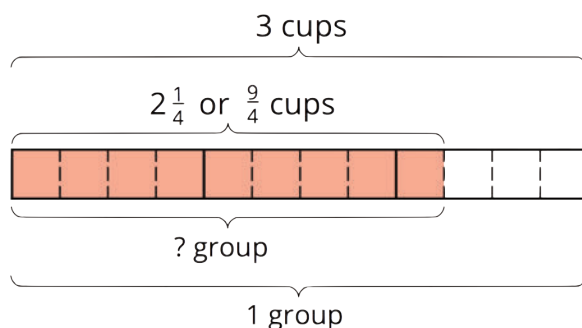
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In *any* situation where we want to know what fraction one number is of another number, we can write a division equation to help us find the answer.

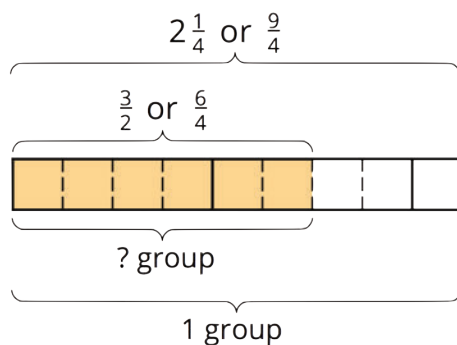
For example, “What fraction of 3 is $2\frac{1}{4}$?” can be expressed as $? \cdot 3 = 2\frac{1}{4}$, which can also be written as $2\frac{1}{4} \div 3 = ?$.

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.

$$\frac{2}{3} \cdot \frac{9}{4} = \frac{18}{12}, \text{ and } \frac{18}{12} \text{ is, indeed, equal to } \frac{3}{2}.$$

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- D. How many kilometers is it from home to the festival and back home?
4. Draw a tape diagram to represent and answer the question: What fraction of $2\frac{1}{2}$ is $\frac{4}{5}$?
5. How many groups of $\frac{3}{4}$ are in each of the following quantities?
- a. $\frac{11}{4}$
- b. $6\frac{1}{2}$

(from Unit 4, Lesson 6)

6. Which question can be represented by the equation $4 \div \frac{2}{7} = ?$
- A. What is 4 groups of $\frac{2}{7}$?
- B. How many $\frac{2}{7}$ s are in 4?
- C. What is $\frac{2}{7}$ of 4?
- D. How many 4s are in $\frac{2}{7}$?

(from Unit 4, Lesson 4)