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Unit 4, Lesson 12: Fractional Lengths

Let's solve problems about fractional lengths.

12.1: Number Talk: Multiplication Strategies

Find the product mentally.

$$19 \cdot 14$$

12.2: How Many Would It Take? (Part 1)

1. Jada was using square stickers with a side length of $\frac{3}{4}$ inch to decorate the spine of a photo album. The spine is $10\frac{1}{2}$ inches long. If she laid the stickers side by side without gaps or overlaps, how many stickers did she use to cover the length of the spine?
2. How many $\frac{5}{8}$ -inch binder clips, laid side by side, make a length of $11\frac{1}{4}$ inches?
3. It takes exactly 26 paper clips laid end to end to make a length of $17\frac{7}{8}$ inches.
 - a. Estimate the length of each paper clip.
 - b. Calculate the length of each paper clip. Show your reasoning.

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Are you ready for more?

Lin has a work of art that is 14 inches by 20 inches. She wants to frame it with large paper clips laid end to end.

1. If each paper clip is $1\frac{3}{4}$ inch long, how many paper clips would she need? Show your reasoning and be sure to think about potential gaps and overlaps. Consider making a sketch that shows how the paper clips could be arranged.

2. How many paper clips are needed if the paper clips are spaced $\frac{1}{4}$ inch apart? Describe the arrangement of the paper clips at the corners of the frame.

12.3: How Many Times as Tall or as Far?

1. A second-grade student is 4 feet tall. Her teacher is $5\frac{2}{3}$ feet tall.
 - a. How many times as tall as the student is the teacher?
 - b. What fraction of the teacher's height is the student's height?

2. Find each quotient. Show your reasoning and check your answer.
 - a. $9 \div \frac{3}{5}$
 - b. $1\frac{7}{8} \div \frac{3}{4}$

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3. Write a division expression that can help answer each of the following questions. Then answer the question. If you get stuck, draw a diagram.

a. A runner ran $1\frac{4}{5}$ miles on Monday and $6\frac{3}{10}$ miles on Tuesday. How many times her Monday's distance was her Tuesday's distance?

b. A cyclist planned to ride $9\frac{1}{2}$ miles but only managed to travel $3\frac{7}{8}$ miles. What fraction of his planned trip did he travel?

12.4: Comparing Paper Rolls

The photo shows a situation that involves fractions.



1. Use the photo to help you complete the following statements. Explain or show your reasoning for the second statement.

a. The length of the long paper roll is about _____ times the length of the short paper roll.

b. The length of the short paper roll is about _____ times the length of the long paper roll.

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2. If the length of the long paper roll is $11\frac{1}{4}$ inches, what is the length of each short paper roll?

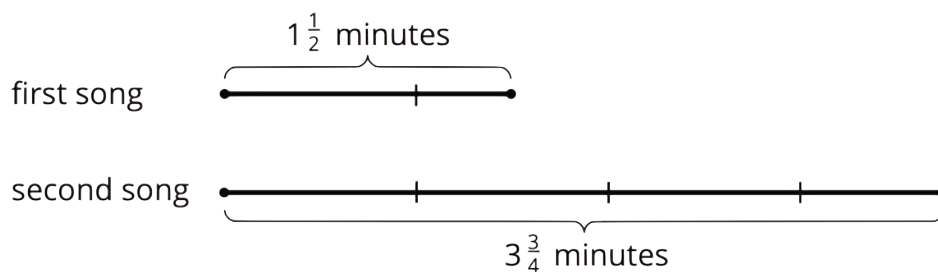
Use the information you have about the paper rolls to write a multiplication equation or a division equation for the question. Note that $11\frac{1}{4} = \frac{45}{4}$.

3. Answer the question. If you get stuck, draw a diagram.

Lesson 12 Summary

Division can help us solve comparison problems in which we find out how many times as large or as small one number is compared to another. Here is an example.

A student is playing two songs for a music recital. The first song is $1\frac{1}{2}$ minutes long. The second song is $3\frac{3}{4}$ minutes long.



We can ask two different comparison questions and write different multiplication and division equations to represent each question.

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- How many times as long as the first song is the second song?

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

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

Let's use the algorithm we learned to calculate the quotient:

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

$$= \frac{15}{4} \div \frac{3}{2}$$

$$= \frac{15}{4} \cdot \frac{2}{3}$$

$$= \frac{30}{12}$$

$$= \frac{5}{2}$$

This means the second song is $2\frac{1}{2}$ times as long as the first song.

- What fraction of the second song is the first song?

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

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

Let's calculate the quotient:

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

$$= \frac{3}{2} \div \frac{15}{4}$$

$$= \frac{3}{2} \cdot \frac{4}{15}$$

$$= \frac{12}{30}$$

$$= \frac{2}{5}$$

The first song is $\frac{2}{5}$ as long as the second song.

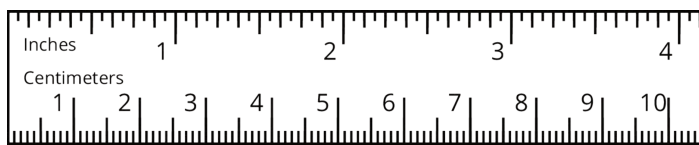
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Unit 4, Lesson 12: Fractional Lengths

1. One inch is around $2\frac{11}{20}$ centimeters.



a. How many centimeters long is 3 inches?
Show your reasoning.

b. What fraction of an inch is 1 centimeter?
Show your reasoning.

c. What question can be answered by finding $10 \div 2\frac{11}{20}$?

2. A zookeeper is $6\frac{1}{4}$ feet tall. A young giraffe in his care is $9\frac{3}{8}$ feet tall.

a. How many times as tall as the zookeeper is the giraffe?

b. What fraction of the giraffe's height is the zookeeper's height?

3. A rectangular bathroom floor is covered with square tiles that are $1\frac{1}{2}$ feet by $1\frac{1}{2}$ feet. The length of the bathroom floor is $10\frac{1}{2}$ feet and the width is $6\frac{1}{2}$ feet.

a. How many tiles does it take to cover the length of the floor?

b. How many tiles does it take to cover the width of the floor?

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4. The Food and Drug Administration (FDA) recommends a certain amount of nutrient intake per day called the “daily value.” Food labels usually show percentages of the daily values for several different nutrients—calcium, iron, vitamins, etc.

In $\frac{3}{4}$ cup of oatmeal, there is $\frac{1}{10}$ of the recommended daily value of iron. What fraction of the daily recommended value of iron is in 1 cup of oatmeal?

Write a multiplication equation and a division equation to represent the question, and then answer the question. Show your reasoning.

(from Unit 4, Lesson 11)

5. What fraction of $\frac{1}{2}$ is $\frac{1}{3}$? Draw a tape diagram to represent and answer the question. Use graph paper if needed.

(from Unit 4, Lesson 7)

6. Noah says, “There are $2\frac{1}{2}$ groups of $\frac{4}{5}$ in 2.” Do you agree with his statement? Draw a tape diagram to show your reasoning. Use graph paper, if needed.

(from Unit 4, Lesson 6)