Student Guide

Problems of Scale (SG pp. 236–237) Questions 1–5

1. **A.*** Possible response: Luis can use equivalent ratios to find the length of the actual window. Since he knows 3 centimeters × 4 = 12 centimeters, he can multiply 1 foot × 4 = 4 feet to find the actual window would be 4 feet tall.

   B.* Possible response: Luis can solve this number sentence to find that the width of the actual window will be 2 feet. Since 6 centimeters is half of 12 centimeters, the width of the widow will be half of 4 feet, or 2 feet.

$$\frac{12 \text{ centimeters}}{4 \text{ feet}} = \frac{6 \text{ centimeters}}{2 \text{ feet}}$$

2. **A.** 2 feet

   B. First I wrote a number sentence to show the ratio of 1 inch = 1 foot. Since I know that 2 inches is twice 1 inch, I doubled 1 foot and found that the actual window will be 2 feet wide.

$$\frac{1 \text{ inch}}{1 \text{ foot}} = \frac{2 \text{ inches}}{2 \text{ feet}}$$

3. $$\frac{1 \text{ cm}}{9 \text{ miles}} = \frac{6 \text{ centimeters}}{54 \text{ miles}}$$

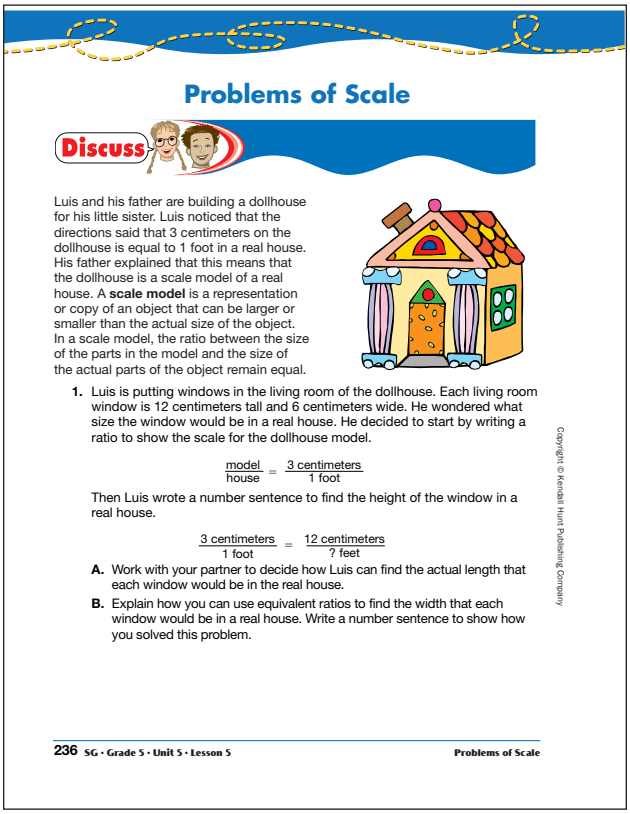
4. **A.** 36 centimeters

   B. First I wrote a ratio to show the relationship between the length of the wing on the model and the length of the actual wing on an airplane. I wrote a second ratio to show the actual length of the body of the airplane. I put a box to show that I had to find the length of the body on the model.

$$\frac{12 \text{ centimeters}}{6 \text{ meters}} = \frac{\square \text{ centimeters}}{18 \text{ meters}}$$

   I multiplied 6 meters × 3 = 18 meters. I multiplied 12 centimeters × 3 = 36 centimeters to find the length of the body on the model airplane.

5. $3\frac{1}{2}$ inches



Problems of Scale

Discuss

Luis and his father are building a dollhouse for his little sister. Luis noticed that the directions said that 3 centimeters on the dollhouse is equal to 1 foot in a real house. His father explained that this means that the dollhouse is a scale model of a real house. A **scale model** is a representation or copy of an object that can be larger or smaller than the actual size of the object. In a scale model, the ratio between the size of the parts in the model and the size of the actual parts of the object remain equal.

1. Luis is putting windows in the living room of the dollhouse. Each living room window is 12 centimeters tall and 6 centimeters wide. He wondered what size the window would be in a real house. He decided to start by writing a ratio to show the scale for the dollhouse model.

$$\frac{\text{model}}{\text{house}} = \frac{3 \text{ centimeters}}{1 \text{ foot}}$$

Then Luis wrote a number sentence to find the height of the window in a real house.

$$\frac{3 \text{ centimeters}}{1 \text{ foot}} = \frac{12 \text{ centimeters}}{? \text{ feet}}$$

A. Work with your partner to decide how Luis can find the actual length that each window would be in the real house.

B. Explain how you can use equivalent ratios to find the width that each window would be in a real house. Write a number sentence to show how you solved this problem.

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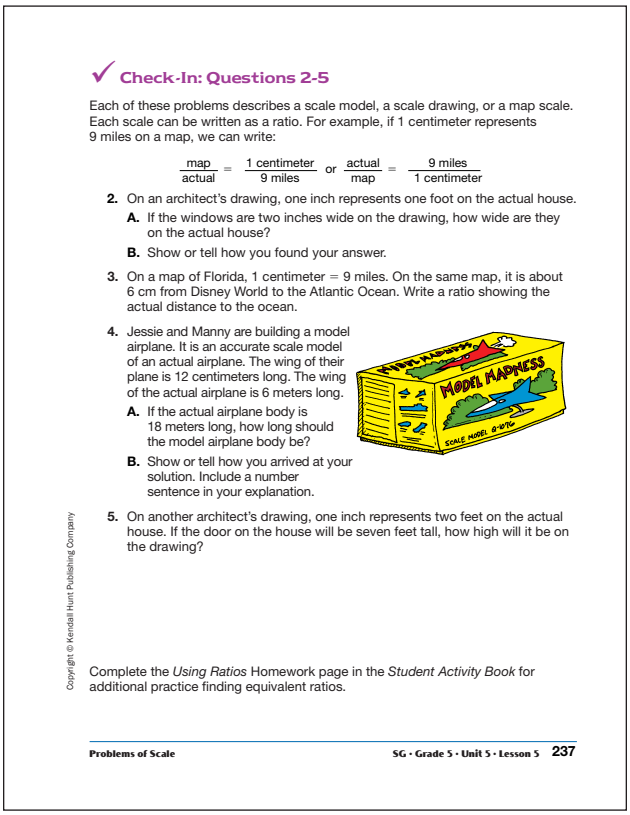

Check-In: Questions 2-5

Each of these problems describes a scale model, a scale drawing, or a map scale. Each scale can be written as a ratio. For example, if 1 centimeter represents 9 miles on a map, we can write:

$$\frac{\text{map}}{\text{actual}} = \frac{1 \text{ centimeter}}{9 \text{ miles}} \text{ or } \frac{\text{actual}}{\text{map}} = \frac{9 \text{ miles}}{1 \text{ centimeter}}$$

2. On an architect's drawing, one inch represents one foot on the actual house.
   A. If the windows are two inches wide on the drawing, how wide are they on the actual house?
   B. Show or tell how you found your answer.
3. On a map of Florida, 1 centimeter = 9 miles. On the same map, it is about 6 cm from Disney World to the Atlantic Ocean. Write a ratio showing the actual distance to the ocean.
4. Jessie and Manny are building a model airplane. It is an accurate scale model of an actual airplane. The wing of their plane is 12 centimeters long. The wing of the actual airplane is 6 meters long.
   A. If the actual airplane body is 18 meters long, how long should the model airplane body be?
   B. Show or tell how you arrived at your solution. Include a number sentence in your explanation.
5. On another architect's drawing, one inch represents two feet on the actual house. If the door on the house will be seven feet tall, how high will it be on the drawing?

Complete the *Using Ratios* Homework page in the *Student Activity Book* for additional practice finding equivalent ratios.

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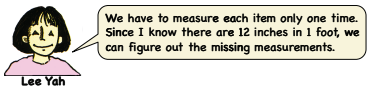
***Answers and/or discussion are included in the lesson.**

Name _____ Date _____

Using Ratios in Measurement

1. Lee Yah and Peter are measuring items in their classroom. Lee Yah wanted to give the length of each item in inches and Peter wanted to give the length in feet.



Peter and Lee Yah recorded their measurements in a table. Use what you know about the relationship between inches and feet to fill in the missing measurements.

Measuring in Feet and Inches

	Item Measured	Inches	Feet
	Length of a math book	12 inches	1 foot
A.	Height of a shelf		2 feet
B.	Length of a table		6 feet
C.	Width of a table	36 inches	
D.	Width of the door	30 inches	
E.	Height of the door		7 feet

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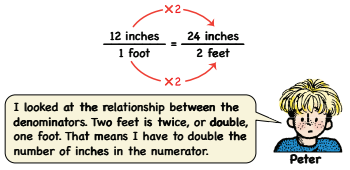
Name _____ Date _____

2. Peter used what he knows about equivalent ratios to find the height of the shelf in inches.



Use Peter's strategy to complete the number sentences.

A. $\frac{12 \text{ inches}}{1 \text{ foot}} = \frac{\square \text{ inches}}{4 \text{ feet}}$

B. $\frac{1 \text{ foot}}{12 \text{ inches}} = \frac{\square \text{ feet}}{60 \text{ inches}}$

C. Show or tell how you solved Question 2B.

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Student Activity Book

Using Ratio in Measurement (SAB pp. 213–216) Questions 1–5

1.

Measuring in Feet and Inches

	Item Measured	Inches	Feet
	Length of a math book	12 inches	1 foot
A.	Height of a shelf	24 inches	2 feet
B.*	Length of a table	72 inches	6 feet
C.	Width of a table	36 inches	3 feet
D.*	Width of the door	30 inches	$2\frac{1}{2}$ feet
E.	Height of the door	84 inches	7 feet

2. **A.*** 48 inches
   B. 5 feet
   C. I know that 5×12 inches $= 60$ inches, so I multiplied 1 foot $\times 5 = 5$ feet to find the missing value.

*Answers and/or discussion are included in the lesson.