Student Guide

Questions 1–14 (SG pp. 56–58)

1.* Find the perimeter (length of wire) of the runways (rectangles) with fixed widths and different lengths.

2.* See Figure 2 in Lesson Guide 2 for a sample picture.

3. A.* width

B. length, perimeter

4.* See Figures 3 and 4 in Lesson Guide 2 for sample data tables.

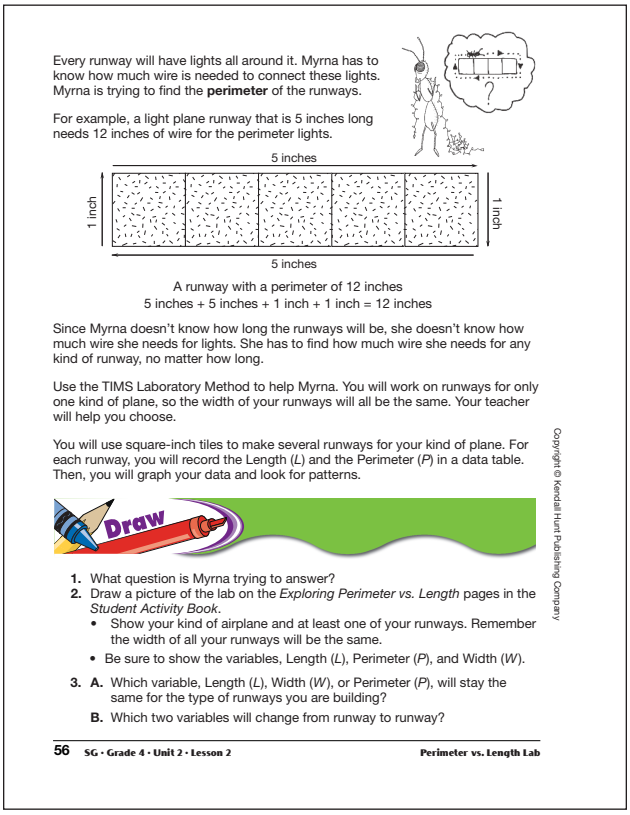
5.* A. See Figure 3 in Lesson Guide 2.

B. See Figure 4 in Lesson Guide 2.

6.* See Figure 5 in Lesson Guide 2 for a sample graph.

7.* Answers will vary. Students might say that the points go uphill or they fall on a line.

8.* See Figure 5 in Lesson Guide 2 for a sample graph.



Every runway will have lights all around it. Myrna has to know how much wire is needed to connect these lights. Myrna is trying to find the **perimeter** of the runways.

For example, a light plane runway that is 5 inches long needs 12 inches of wire for the perimeter lights.

A runway with a perimeter of 12 inches
5 inches + 5 inches + 1 inch + 1 inch = 12 inches

Since Myrna doesn't know how long the runways will be, she doesn't know how much wire she needs for lights. She has to find how much wire she needs for any kind of runway, no matter how long.

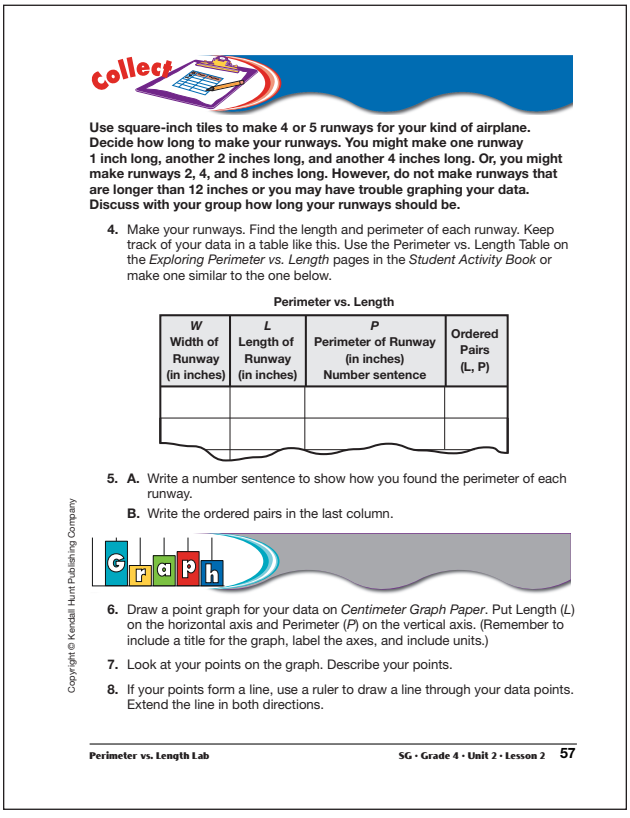
Use the TIMS Laboratory Method to help Myrna. You will work on runways for only one kind of plane, so the width of your runways will all be the same. Your teacher will help you choose.

You will use square-inch tiles to make several runways for your kind of plane. For each runway, you will record the Length (*L*) and the Perimeter (*P*) in a data table. Then, you will graph your data and look for patterns.

Draw

1. What question is Myrna trying to answer?
2. Draw a picture of the lab on the *Exploring Perimeter vs. Length* pages in the *Student Activity Book*.
   - Show your kind of airplane and at least one of your runways. Remember the width of all your runways will be the same.
   - Be sure to show the variables, Length (*L*), Perimeter (*P*), and Width (*W*).
3. **A.** Which variable, Length (*L*), Width (*W*), or Perimeter (*P*), will stay the same for the type of runways you are building?
   B. Which two variables will change from runway to runway?

***Student Guide* - Page 56**



Collect

Use square-inch tiles to make 4 or 5 runways for your kind of airplane. Decide how long to make your runways. You might make one runway 1 inch long, another 2 inches long, and another 4 inches long. Or, you might make runways 2, 4, and 8 inches long. However, do not make runways that are longer than 12 inches or you may have trouble graphing your data. Discuss with your group how long your runways should be.

4. Make your runways. Find the length and perimeter of each runway. Keep track of your data in a table like this. Use the Perimeter vs. Length Table on the *Exploring Perimeter vs. Length* pages in the *Student Activity Book* or make one similar to the one below.

Perimeter vs. Length

W Width of Runway (in inches)	*L* Length of Runway (in inches)	*P* Perimeter of Runway (in inches) Number sentence	Ordered Pairs (L, P)

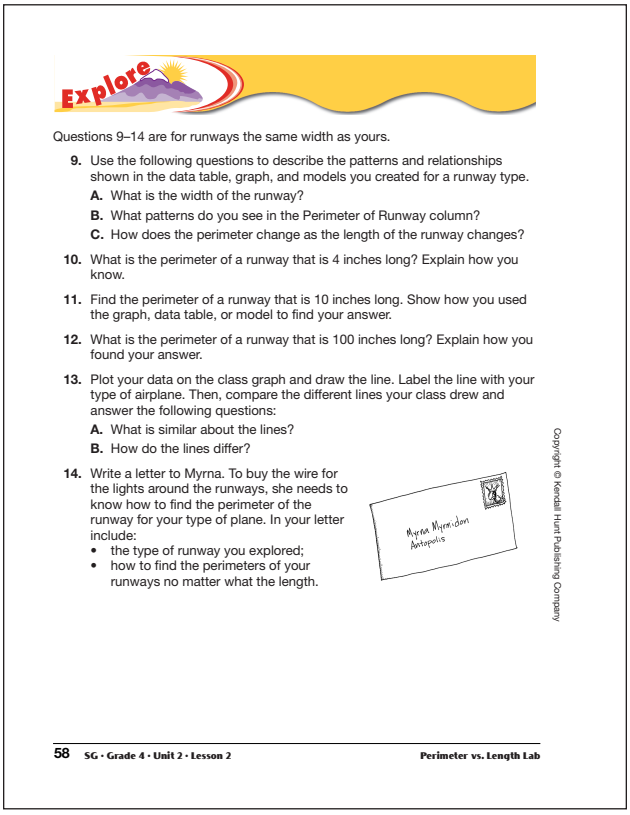
5. **A.** Write a number sentence to show how you found the perimeter of each runway.
   B. Write the ordered pairs in the last column.

Graph

6. Draw a point graph for your data on *Centimeter Graph Paper*. Put Length (*L*) on the horizontal axis and Perimeter (*P*) on the vertical axis. (Remember to include a title for the graph, label the axes, and include units.)
7. Look at your points on the graph. Describe your points.
8. If your points form a line, use a ruler to draw a line through your data points. Extend the line in both directions.

***Student Guide* - Page 57**

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



Explore

Questions 9–14 are for runways the same width as yours.

9. Use the following questions to describe the patterns and relationships shown in the data table, graph, and models you created for a runway type.
   - **A.** What is the width of the runway?
   - **B.** What patterns do you see in the Perimeter of Runway column?
   - **C.** How does the perimeter change as the length of the runway changes?
10. What is the perimeter of a runway that is 4 inches long? Explain how you know.
11. Find the perimeter of a runway that is 10 inches long. Show how you used the graph, data table, or model to find your answer.
12. What is the perimeter of a runway that is 100 inches long? Explain how you found your answer.
13. Plot your data on the class graph and draw the line. Label the line with your type of airplane. Then, compare the different lines your class drew and answer the following questions:
    - **A.** What is similar about the lines?
    - **B.** How do the lines differ?
14. Write a letter to Myrna. To buy the wire for the lights around the runways, she needs to know how to find the perimeter of the runway for your type of plane. In your letter include:
    - the type of runway you explored;
    - how to find the perimeters of your runways no matter what the length.

58 SG • Grade 4 • Unit 2 • Lesson 2 Perimeter vs. Length Lab

***Student Guide* - Page 58**

9. A. Answers will vary. Light planes are 1 inch wide, commuter planes are 2 inches wide, short-haul jets are 3 inches wide, long-haul jets are 4 inches wide, and heavy-transport planes are 5 inches wide.

B.* The perimeter increases by two as the length increases by one.

C. It gets larger. The perimeter is two lengths plus 2 widths.

10.* Answers will vary. For light planes: 10 inches; for commuter planes: 12 inches; for short-haul jets: 14 inches; for long-haul jets: 16 inches; and for heavy-transport planes: 18 inches.

11.* Answers will vary. A sample graph showing interpolation for data on heavy-transport planes is shown in Figure 5 of Lesson Guide 2. For light planes: 22 inches, for commuter planes: 24 inches, for short-haul jets: 26 inches, for long-haul jets: 28 inches, and for heavy-transport planes: 30 inches.

12.* Answers will vary. For light planes: 202 inches; for commuter planes: 204 inches; for short-haul jets: 206 inches; for long-haul jets: 208 inches; and for heavy-transport planes: 210 inches. Possible explanation: I added the length two times and width two times.

13. A.* All the lines go up at the same rate.

B.* The lines for the smaller planes lie below lines for larger planes.

14.* Answers will vary. See Figures 9, 10, and 11 for sample letters.

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

Student Guide

Homework (SG pp. 59–60)

Questions 1–11

1–4. Answers will vary. Student explanations should include discussion of how actual measurements or the 36-inch reference were used to arrive at an estimate. Students should include a drawing of their room with measurements.

5. 20 inches

6. 14 inches

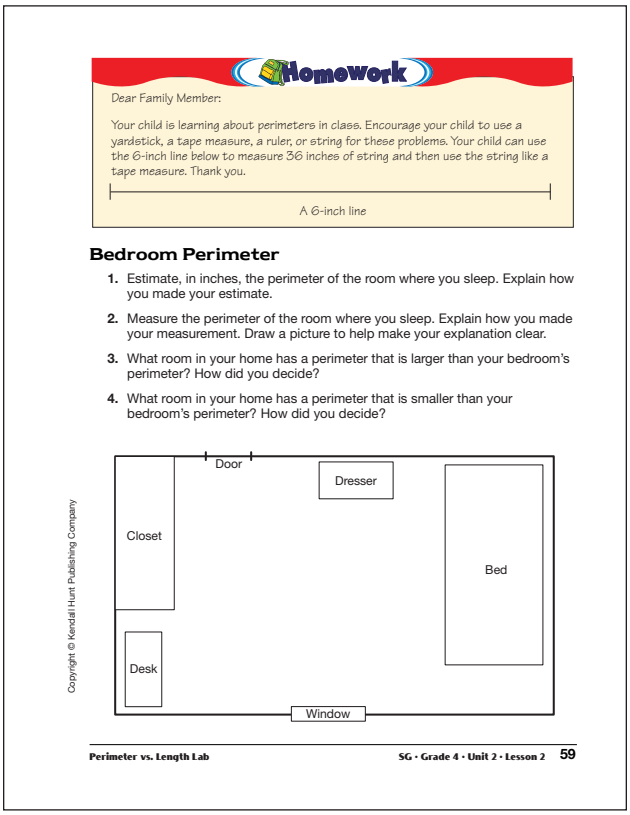
7. 10 inches

8. 5 inches

9. 4 inches. Explanations will vary. A student could start by taking any point and reasoning from that. For example, the point (2, 12) indicates a length of 2 and a perimeter of 12. If you double 2 (for 2 lengths), it is 4, leaving 8 for the other two sides. Half of 8 is 4 so the width is 4.

10. 18 inches

11. 1 inch. Explanations will vary. 10 + 10 = 20 inches. That leaves 2 inches for the other two sides. Half of 2 is 1. So the runway is 10 inches long and 1 inch wide.



Homework

Dear Family Member:

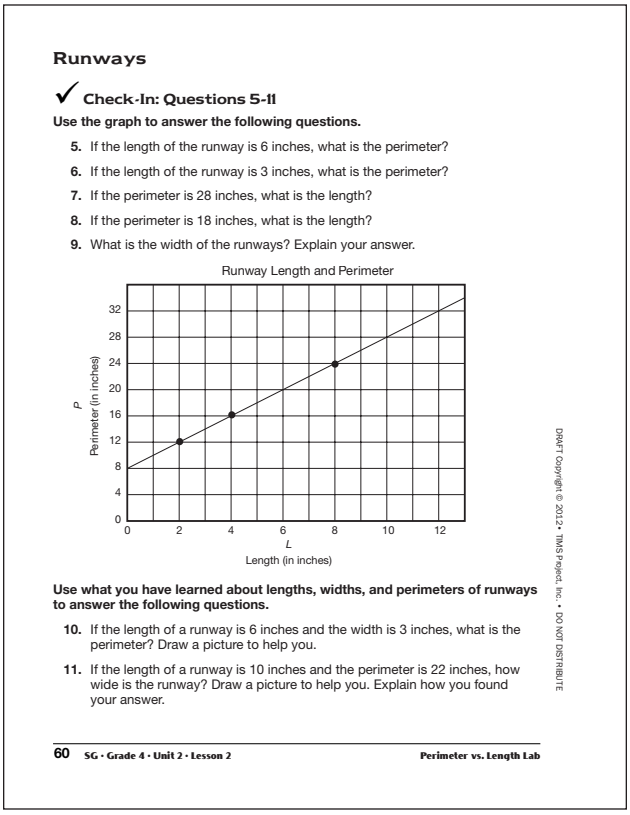
Your child is learning about perimeters in class. Encourage your child to use a yardstick, a tape measure, a ruler, or string for these problems. Your child can use the 6-inch line below to measure 36 inches of string and then use the string like a tape measure. Thank you.

A 6-inch line

Bedroom Perimeter

1. Estimate, in inches, the perimeter of the room where you sleep. Explain how you made your estimate.
2. Measure the perimeter of the room where you sleep. Explain how you made your measurement. Draw a picture to help make your explanation clear.
3. What room in your home has a perimeter that is larger than your bedroom's perimeter? How did you decide?
4. What room in your home has a perimeter that is smaller than your bedroom's perimeter? How did you decide?

***Student Guide* - Page 59**



Runways

✓ **Check-In: Questions 5-11**

Use the graph to answer the following questions.

5. If the length of the runway is 6 inches, what is the perimeter?
6. If the length of the runway is 3 inches, what is the perimeter?
7. If the perimeter is 28 inches, what is the length?
8. If the perimeter is 18 inches, what is the length?
9. What is the width of the runways? Explain your answer.

Use what you have learned about lengths, widths, and perimeters of runways to answer the following questions.

10. If the length of a runway is 6 inches and the width is 3 inches, what is the perimeter? Draw a picture to help you.
11. If the length of a runway is 10 inches and the perimeter is 22 inches, how wide is the runway? Draw a picture to help you. Explain how you found your answer.

***Student Guide* - Page 60**