

**Planning the Experiment**

Shannon used the sandwich she brought for lunch to do an experiment. She placed her sandwich on a two-pan balance and used standard masses to find its mass. Then she took a bite out of her sandwich and found the mass of the remaining sandwich. Shannon kept taking bites out of her sandwich, each time finding the mass, until her sandwich was gone. She recorded her data in a table like the one below.



Mass of a Sandwich		
<i>N</i> Number of Bites	<i>M</i> Mass in Grams	Ordered Pairs ( <i>N</i> , <i>M</i> )
0		
1		
2		

You will repeat Shannon's experiment using a sandwich of your own.

**Discuss**

1. What are the two main variables in the experiment?
2. A. Which of the two main variables is the manipulated variable? Justify your answer.  
B. Which is the responding variable? Justify your answer.  
C. What letters will you use to stand for the two main variables?
3. Shannon wants to look for patterns in the data to help her make predictions about the number of bites and the mass of the sandwich. What important variables should she keep fixed?

**Draw**

Draw a picture of the experiment. Be sure to identify the variables in your picture. Label the main variables with letters.

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**Conducting the Experiment**

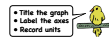
**Collect**

Make a data table like Shannon's using a blank *Three-Column Data Table*. Label the first two columns with the variables and units. Use the third column for ordered pairs.

4. Collect data for 0, 1, 2, and 4 bites. Record your data in a table like the one Shannon used.



5. Use *Centimeter Graph Paper* to make a point graph of the data in your table.
6. A. When the number of bites you took was zero, what was the mass of the sandwich?  
B. Find this data point on your graph. Where is it located?  
C. What is the ordered pair for this point?



**Explore**

7. If the points suggest a line, draw a best-fit line. If they suggest a curve, draw one.
8. Use your graph to estimate the mass of the sandwich after your third bite. Write down your estimate.

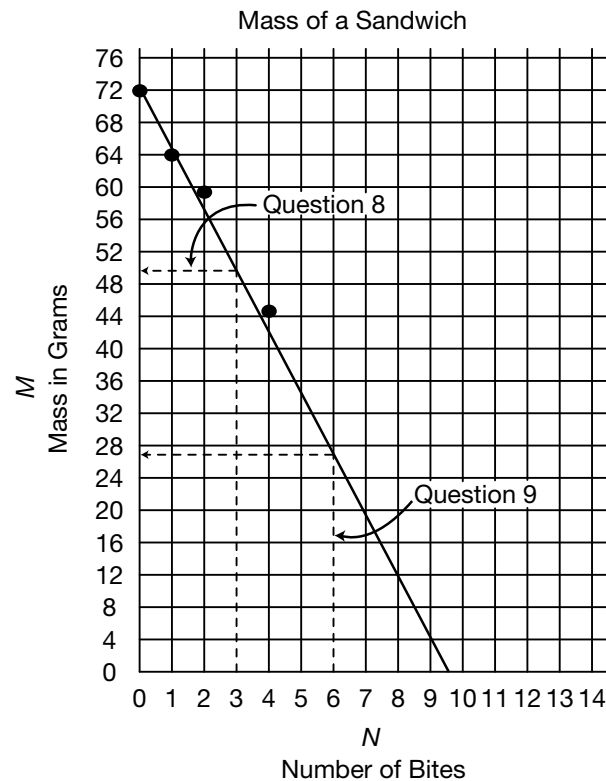
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\*Answers and/or discussion are included in the lesson.

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**Questions 1–16 (SG pp. 573–576)**

1. Number of Bites and Mass
2. A.\* Number of Bites; I chose the Number of Bites before I started.  
B.\* Mass of remaining sandwich in grams; I find the mass when I collect the data.  
C.\* *N* and *M*
- 3.\* size of bite. The biter and type of sandwich are also fixed variables.
- 4.\* See Figure 2 in Lesson 6 for a sample data table.
- 5.



Questions 6–11 are answered using the sample graph in Question 5.

Answers will vary based on students' data.


6. A.\* 72 grams  
B.\* The data point is on the vertical axis when the mass is 72 grams.  
C.\* (0, 72)
- 7.\* See Figure 3 in Lesson 6 for a sample best-fit line.
- 8.\* About 50 grams.

9. **A.\*** About 27 grams.  
**B.\*** Answers will vary.
10. **A.\*** The number of bites gets larger as you go down the column. There is a doubling pattern for 1, 2, and 4 bites.  
**B.\*** The mass of the sandwich gets smaller as you go down the column.  
**C.\*** About 8 grams.  
**D.\*** About 8 grams. Possible strategies: If you move one space to the right on the graph, the mass goes down about 8 grams.  
 Or, My sandwich had a mass of 72 grams and it took about 9 bites to finish my whole sandwich.  $72 \text{ g} \div 9 \text{ bites} = 8 \text{ grams}$
11. **A.\*** 10 bites  
**B.\*** Answers will vary.
12. Answers will vary.
13. **A–B.\*** Answers will vary. See the lesson for a discussion.
- 14.\* Student stories will vary. Jackie’s sandwich had more mass and she took slightly larger bites.
15. **A–C.\*** See Lesson 6 for a description of the graphs.
16. Romesh’s graph has a curve instead of a straight line. This is because he took large bites of his apple at first, but they got smaller and he never completely finished his apple. The line on the graph never crosses the horizontal axis.

9. **A.** Use your graph to predict the mass of the sandwich after your sixth bite. Write down your prediction.  
**B.** Check your prediction by collecting data for 6 bites. Is your prediction close to the actual mass?

10. Look at your data table and graph to answer these questions.  
**A.** Look down the columns on your data table. Does the number of bites increase or decrease? Describe any pattern you see.  
**B.** Does the mass increase or decrease? Describe any pattern you see.  
**C.** Use your graph to answer the following question: How much does the mass change each time you take one bite?  
**D.** Estimate the mass of one bite. Show or tell how you made your estimate.

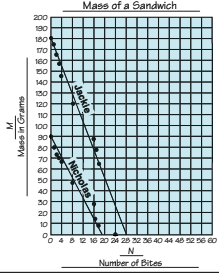
11. **A.** Predict how many bites it would take for you to eat your entire sandwich. Show or tell how you made your prediction.  
**B.** Finish your sandwich and check your prediction.

**Discuss** 

12. Plot your partner’s data on your graph. Compare your graph and data with your partner’s. How are they the same? How are they different?

13. **A.** Who has a bigger bite size, you or your partner?  
**B.** Which student had the larger sandwich?

14. Two students’ lines for the experiment are shown below. Tell a story for this graph. Include in your story which student had the sandwich with the most mass and which student took bigger bites.



**Mass of a Sandwich**

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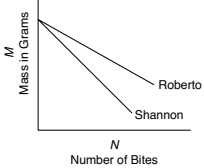
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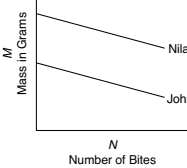
15. Three pairs of students do a similar experiment. They mass a sandwich, then record the mass after one bite, two bites, and four bites have been eaten. Then they draw a best-fit line.

**A.** Tell what is the same and different for each graph.  
**B.** For each pair, what does the graph say about the mass of each sandwich?  
**C.** For each pair, what does the graph say about the size of the students’ bites?

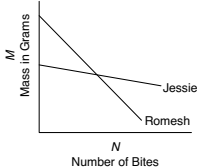
**Graph A**




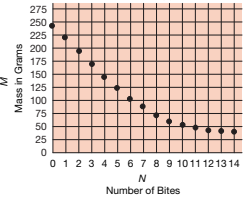
**Graph B**



**Graph C**



16. Romesh did this lab with an apple. He plotted his data in a graph. Tell a story about the graph.

Use the *Graph Stories* pages in the *Student Activity Book* for more practice reading point graphs.

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