Mass vs. Number

Yolanda bakes wonderful oat bran bars. She decided to start her own business selling them. When customers send her an order, she sends them the bars by mail. The mailing cost depends on the mass of each package. Her customers order different numbers of bars. Yolanda thought, "How can I find the mass for any number of bars?"

Yolanda found the total mass of 1, 2, 4, and 8 bars. Here is her data.

Mass of Yolanda's Bars

N Number of Oat Bran Bars	*M* Mass (in g)
1	18
2	39
4	82
8	160

Discuss

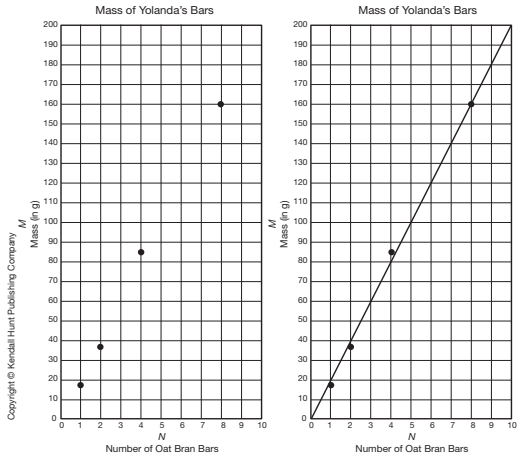
1. What patterns do you see in the data table?
   - **A.** What patterns do you see if you look down the columns?
   - **B.** What patterns do you see if you look across the rows? (Hint: Use friendly numbers.)
2. **A.** What happens to the mass of the bars if the number of oat bran bars goes up by 2 bars?
   - **B.** What happens to the mass of the bars if the number of oat bran bars doubles?

***Student Guide* - Page 354**

3. **A.** Predict the mass of 3 bars. Explain your thinking.
   B. Predict the mass of 10 bars. Explain your thinking.
4. If you know the number of bars, how can you estimate the mass?

Yolanda's Graph

Yolanda made a graph of her data. "I see a pattern," she said. "It looks like the data points are on a straight line." Yolanda tried to draw a straight line through her data points. She could not get a line to go through all the points. She tried to fit the points as best she could. Scientists and mathematicians call that a **best-fit line.**



***Student Guide* - Page 355**

Student Guide

Mass vs. Number (SG pp. 354–357)
Questions 1–7

1. **A.*** Looking down the columns, the number of bars doubles and the mass almost doubles.
   B.* Looking across the rows, the mass of the bars is about 20 times the number of bars.
2. **A.** The mass goes up by about 40 grams.
   B.* If the number of bars doubles, the mass approximately doubles.
3. **A.*** About 60 grams; $3 \times 20 = 60$.
   B.* About 200 grams; 8 bars are 160 grams and 2 bars are 39 grams. $160 + 39 = 199$, which is close to 200.
4. * If you know the number of bars, you can estimate the mass by multiplying the number by 20 grams.

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

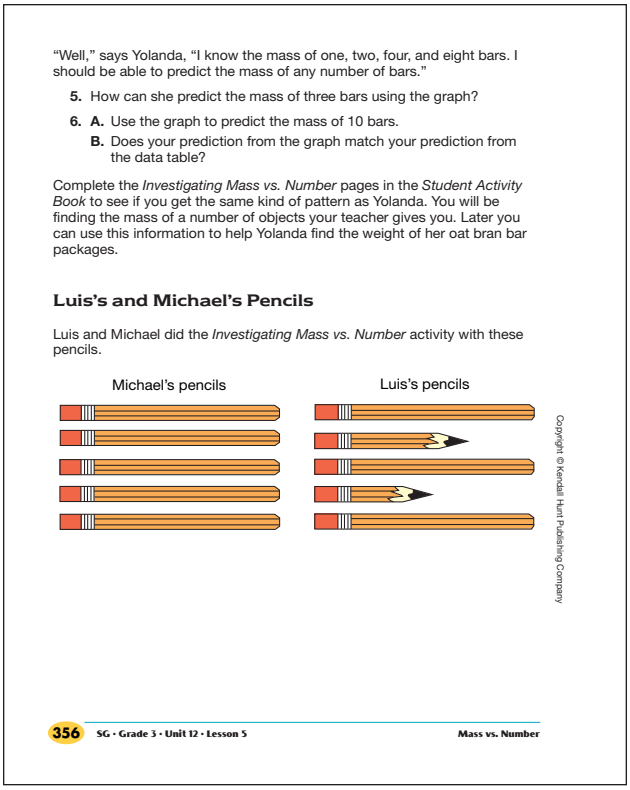
5. Yolanda can predict the mass of three bars by starting at 3 on the horizontal axis and going up to the line and then moving across to the vertical axis. 3 bars will have a mass of about 60 grams.

6. **A.** 200 grams

   B. The predictions should be close.

7. **A.*** Michael's data table is the one on the right. All his pencils are unused. It's highly likely that each of Michael's pencils will have the same mass. Michael's data shows a consistent increase of 11 grams for each additional pencil he adds to the balance.

   B.* Michael's graph is on the left. His points lie on a line perfectly.



"Well," says Yolanda, "I know the mass of one, two, four, and eight bars. I should be able to predict the mass of any number of bars."

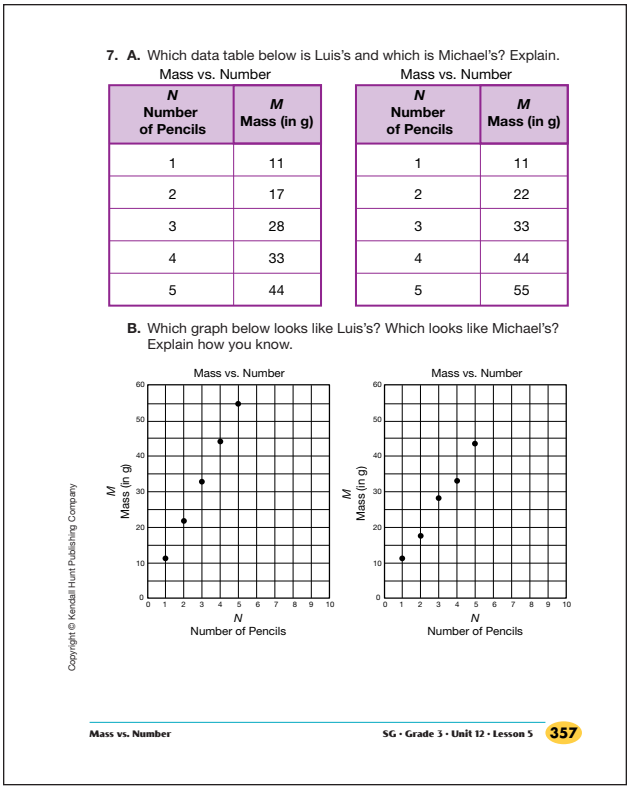
5. How can she predict the mass of three bars using the graph?
6. **A.** Use the graph to predict the mass of 10 bars.
   B. Does your prediction from the graph match your prediction from the data table?

Complete the *Investigating Mass vs. Number* pages in the *Student Activity Book* to see if you get the same kind of pattern as Yolanda. You will be finding the mass of a number of objects your teacher gives you. Later you can use this information to help Yolanda find the weight of her oat bran bar packages.

Luis's and Michael's Pencils

Luis and Michael did the *Investigating Mass vs. Number* activity with these pencils.

***Student Guide* - Page 356**



7. **A.** Which data table below is Luis's and which is Michael's? Explain.

Mass vs. Number

N Number of Pencils	*M* Mass (in g)
1	11
2	17
3	28
4	33
5	44

Mass vs. Number

N Number of Pencils	*M* Mass (in g)
1	11
2	22
3	33
4	44
5	55

B. Which graph below looks like Luis's? Which looks like Michael's? Explain how you know.

***Student Guide* - Page 357**

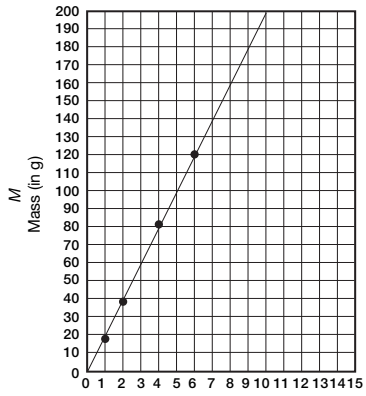
***Answers and/or discussion are included in the lesson.**

Homework

Yolanda's Oat Bran Bars

Orders for Yolanda's oat bran bars have arrived! Yolanda needs to use her best-fit line to make predictions.

Yolanda's Graph



Student Guide - Page 358

Make some predictions from Yolanda's best-fit line. Use her graph to complete a data table like the one below. Copy and complete Yolanda's table.

Mass of Yolanda's Bars

N Number of Oat Bran Bars	*M* Mass (in g)
1	18
2	39
3	
4	82
5	
6	120
8	
	200
12	

Student Guide - Page 359

Homework (SG pp. 358–359)

Yolanda's best-fit line was used to complete the data table.

Mass of Yolanda's Bars

N Number of Oat Bran Bars	*M* Mass (in g)
1	18
2	39
3	**about 57**
4	82
5	**about 98**
6	120
8	**about 157**
10	200
12	**about 240**