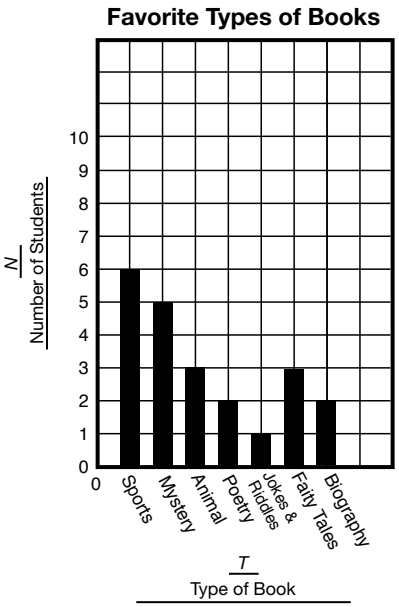
Student Guide

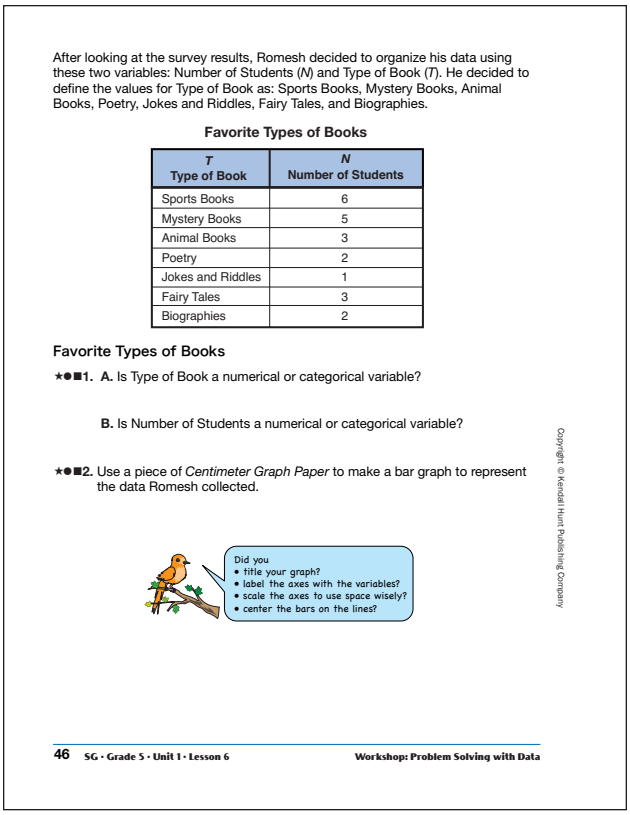
Workshop: Problem Solving with Data (SG pp. 44–49) Questions 1–15

1. **A.** Categorical
   B. Numerical

2. 

3. Book Package Two; Possible response: The first book package does not have any biographies or jokes and riddle books. It also has more Poetry Collections than Mystery Books, Animal Stories, or Fairy Tales and the students liked Animal Stories and Fairy Tales better than Poetry Collections. The third package has books about transportation and no one in the class chose this kind of book as a favorite, and it is missing jokes and riddles books. The second book package has all the types of books kids like and has more than enough of each type so students will have choices about what to read.

4. Possible response: My book package would include 20 books about sports, 20 Mystery Stories, 10 Animal Stories, 10 Fairy Tales, 8 Poetry Collections, 8 Biographies, and 4 Jokes and Riddle Books. I decided on my book choices so each student will have some choices of books that they can read. If everyone has a book and someone finishes his or her book early there will still be some choices for them in the type of book they like to read.



After looking at the survey results, Romesh decided to organize his data using these two variables: Number of Students (*N*) and Type of Book (*T*). He decided to define the values for Type of Book as: Sports Books, Mystery Books, Animal Books, Poetry, Jokes and Riddles, Fairy Tales, and Biographies.

Favorite Types of Books

T Type of Book	*N* Number of Students
Sports Books	6
Mystery Books	5
Animal Books	3
Poetry	2
Jokes and Riddles	1
Fairy Tales	3
Biographies	2

Favorite Types of Books

★●■**1. A.** Is Type of Book a numerical or categorical variable?

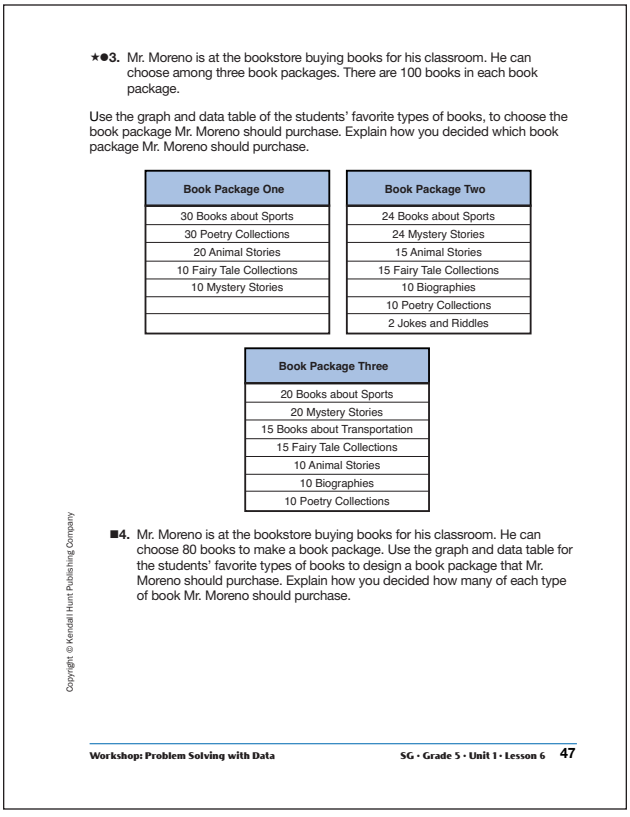
B. Is Number of Students a numerical or categorical variable?

★●■**2.** Use a piece of *Centimeter Graph Paper* to make a bar graph to represent the data Romesh collected.

Did you
- title your graph?
- label the axes with the variables?
- scale the axes to use space wisely?
- center the bars on the lines?

46 SG • Grade 5 • Unit 1 • Lesson 6 Workshop: Problem Solving with Data

***Student Guide* - Page 46**



★●**3.** Mr. Moreno is at the bookstore buying books for his classroom. He can choose among three book packages. There are 100 books in each book package.

Use the graph and data table of the students' favorite types of books, to choose the book package Mr. Moreno should purchase. Explain how you decided which book package Mr. Moreno should purchase.

Book Package One
30 Books about Sports
30 Poetry Collections
20 Animal Stories
10 Fairy Tale Collections
10 Mystery Stories

Book Package Two
24 Books about Sports
24 Mystery Stories
15 Animal Stories
15 Fairy Tale Collections
10 Biographies
10 Poetry Collections
2 Jokes and Riddles

Book Package Three
20 Books about Sports
20 Mystery Stories
15 Books about Transportation
15 Fairy Tale Collections
10 Animal Stories
10 Biographies
10 Poetry Collections

■**4.** Mr. Moreno is at the bookstore buying books for his classroom. He can choose 80 books to make a book package. Use the graph and data table for the students' favorite types of books to design a book package that Mr. Moreno should purchase. Explain how you decided how many of each type of book Mr. Moreno should purchase.

Workshop: Problem Solving with Data SG • Grade 5 • Unit 1 • Lesson 6 47

***Student Guide* - Page 47**

★●■**5.** Irma read that, on average, ten and eleven year olds watch about 24 hours of television each week. She wanted to see if her class was typical so she asked her classmates to keep track of the amount of television they watched in a week. She collected and organized the information in a data table.

Hours Watching Television

H Number of Hours Watching Television in a Week (hours)	*N* Number of Students
16	2
17	3
18	0
19	4
20	2
21	3
22	1
23	0
24	6
25	1

A. What two variables did Irma choose to study?

B. Are the variables categorical or numerical?

★●■**6.** Use a piece of *Centimeter Graph Paper* to make a bar graph of Irma's data in Question 5.

★**7.** How many students watch 20 or fewer hours of television each week? Show how you decided.

●■**8.** How many total hours of television did Mr. Moreno's class watch during the week data was collected?

★●■**9. A.** What is the median number of hours the students spent watching television in a week?

B. What is the mode number of hours students spent watching television in a week?

★●**10.** Which number, the median or the mode, do you think is a better representation of what is a typical number of hours watching television? Explain your thinking.

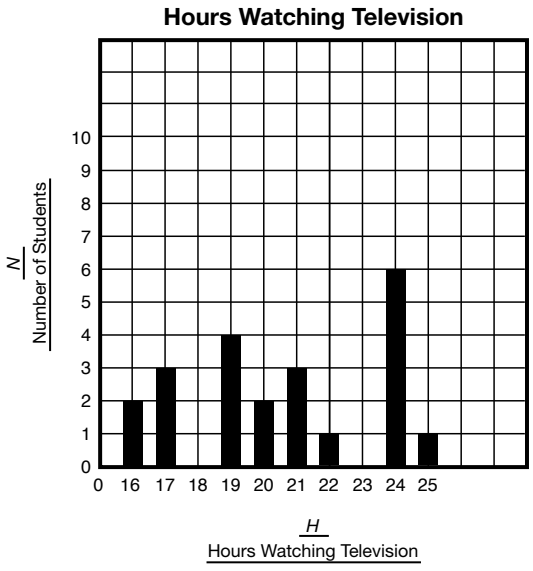
■**11.** Does the data that Irma collected show that the students in her classroom are typical when compared to the research that Irma read about television viewing? Explain how you decided.

***Student Guide* - Page 48**

5. A. Number of Hours Watching Television in a Week and Number of Students

B. both are numerical

6.



7. 11; Possible response: I used the graph. I added the total number of students for all the bars with a value of 20 hours or less.

8. 453 hours

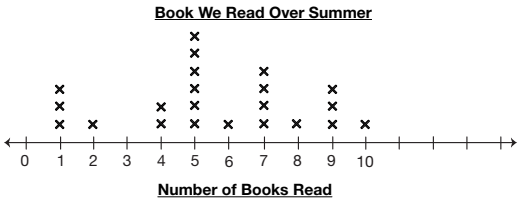
9. A. $20\frac{1}{2}$ hours

B. 24 hours

10. Possible response: I think the median is better because half the kids watched $20\frac{1}{2}$ hours or more and half watched $20\frac{1}{2}$ hours or less. Also, since only 7 students out of 22 total students watched 24 or more hours, 24 is not really typical.

11. Possible response: If you use the mode to show what is typical then her class would be considered typically. If you used the median then her class watches about $3\frac{1}{2}$ hours less each week when compared to what the research said was typical.

12.



13. 5 books; Possible response: I used the line plot. First I counted the number of Xs on the line plot and found there were 22, so I know the median will be between the 11th and 12th X. Then I started counting the Xs from the beginning of the line plot until I got to the 11th X. It was in the stack of Xs for 5 books. I did the same thing from the other end of the line plot. The 11th X counting back was also in the stack for 5 books, so the median number of books read over the summer was 5.

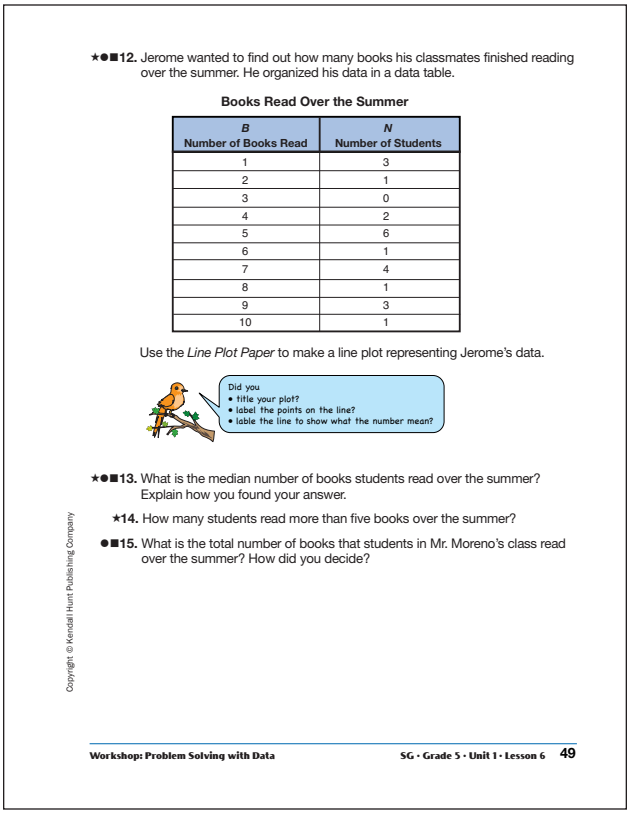
14. 10 students

15. 122 books. Possible response: I used the data table. To find the total books read, first I multiplied the number of students in each row by the number of books they read.

Number of Books Read	Number of Students	Books × Students
1	3	1 × 3 = 3
2	1	2 × 1 = 2
3	0	3 × 0 = 0
4	2	4 × 2 = 8
5	6	5 × 6 = 30
6	1	6 × 1 = 6
7	4	7 × 4 = 28
8	1	8 × 1 = 8
9	3	9 × 3 = 27
10	1	10 × 1 = 10

Then I added all the of products to find the total number of books read:

3 + 2 + 0 + 8 + 30 + 6 + 28 + 8 + 27 + 10 = 122 Books



★●■**12.** Jerome wanted to find out how many books his classmates finished reading over the summer. He organized his data in a data table.

Books Read Over the Summer

B Number of Books Read	*N* Number of Students
1	3
2	1
3	0
4	2
5	6
6	1
7	4
8	1
9	3
10	1

Use the *Line Plot Paper* to make a line plot representing Jerome's data.

Did you
- title your plot?
- label the points on the line?
- lable the line to show what the number mean?

★●■**13.** What is the median number of books students read over the summer? Explain how you found your answer.

★**14.** How many students read more than five books over the summer?

●■**15.** What is the total number of books that students in Mr. Moreno's class read over the summer? How did you decide?

***Student Guide* - Page 49**

Homework

Solve each problem. You will need *Centimeter Graph Paper.*

1. John bowled three games. His scores were 120, 87, and 123. Find his median score.

2. Ming and his friends were playing basketball. They had a contest to see how many baskets each person can make in fifteen minutes. Here is a list of the number of baskets made: 33, 30, 17, 27, 22, 17, 29, 17, 24, 29, and 31.

   A. Find the median number of baskets.

   B. Find the mode.

   C. Which average, the median or the mode, do you think better represents the number of baskets made by Ming and his friends? Explain your thinking.

   D. Ming started to make the below line plot to display the data collected. Draw the line plot on your paper and add the missing information.

Baskets Made in 15 Minutes

***Student Guide* - Page 50**

3. Jackie was watching the birds eat at her bird feeder. She made a data table to record the birds she observed in a ten-minute period. She recorded the type of bird and the number of each type she saw.

Birds at the Bird Feeder

T Type of Bird	*N* Number of Bird
Yellow Finch	4
Sparrow	12
Cardinal	2
Black Capped Chickadee	6
House Finch	3

A. Are the variables Jackie recorded categorical or numerical?

B. Use the *Centimeter Graph Paper* to make a bar graph representing Jackie's data.

C. If another bird comes to the feeder predict what type of bird it would be. Explain why you made your predication.

***Student Guide* - Page 51**

Homework (SG pp. 50–51)
Questions 1–3

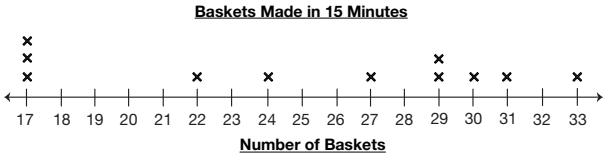
1. 120

2. **A.** 27

   B. 17

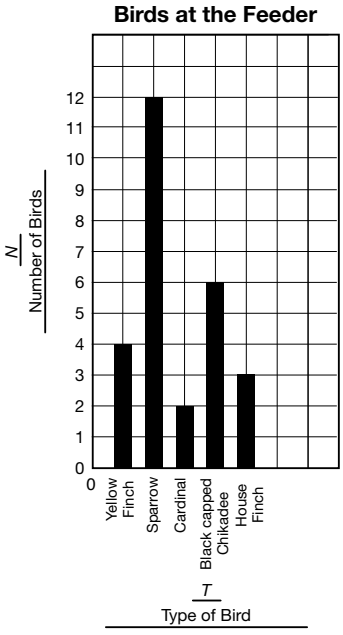
   C. Possible response for median: I think the median is a better average because it is closer to the middle between 17 baskets and 33 baskets, and also half the boys made 27 or less baskets and half made 27 or more baskets.

   D.



3. **A.** Type of Bird is categorical and Number of Birds is numerical.

   B.



   C. Possible response: I think that a sparrow will be the next bird at the feeder because it is the most common bird she saw.

Teacher Guide

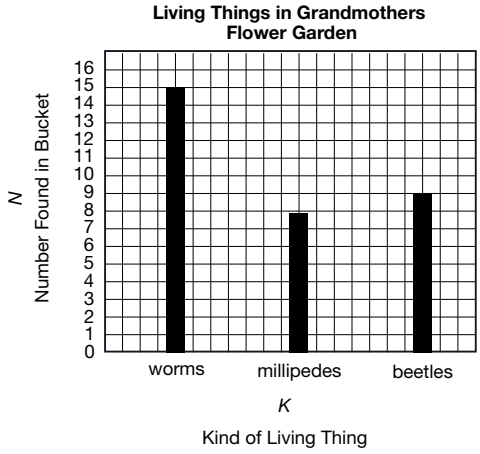
Test Your Knowledge: Using Data to Solve Problems. (TG pp. 1–6) Questions 1–8

1. **A.** Kind of Living Thing and Number of Living Things

   B. Kind of Living Thing is categorical and Number of Living Things is numerical.

   C. Worms 15; Millipedes 8; Beetles 9

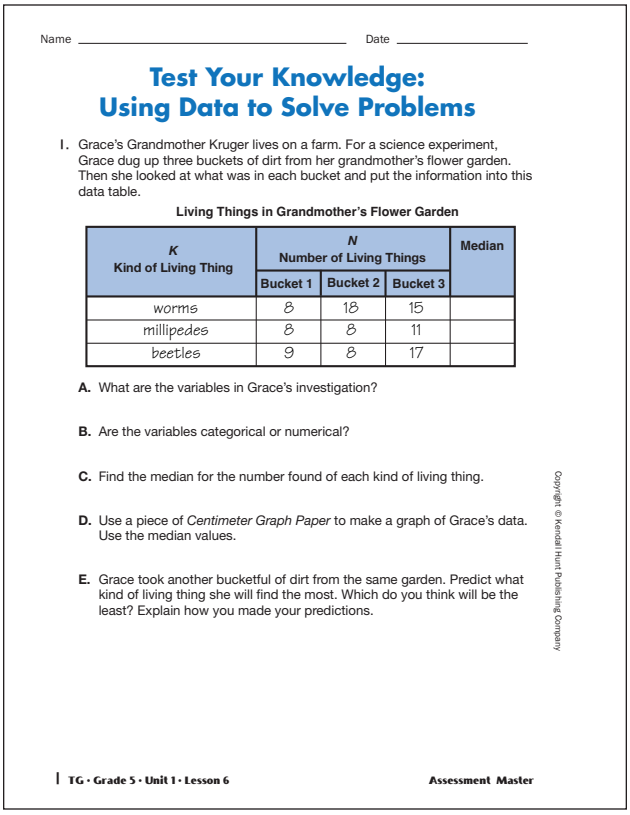
   D.



   E. Grace will most likely find more worms than millipedes or beetles because that had the highest median. Millipedes will most likely be the least because that is the lowest median and the lowest total.

2. **A.** No, Alexis is wrong. The scales on the vertical axis are different so the bars in the Creek graph represent higher numbers than in the Driveway graph.

   B. Answers will vary. Possible reponses: Alexis is right that both graphs show two taller bars and one shorter bar. In the Driveway graph, the tallest bars show 4 living things and the shortest shows 3. In the Creek graph, the tallest bar shows 17 living things and the shortest shows 12. There are more living things by the creek.



Name _____ Date _____

Test Your Knowledge: Using Data to Solve Problems

1. Grace's Grandmother Kruger lives on a farm. For a science experiment, Grace dug up three buckets of dirt from her grandmother's flower garden. Then she looked at what was in each bucket and put the information into this data table.

Living Things in Grandmother's Flower Garden

K Kind of Living Thing	*N* Number of Living Things			Median
	Bucket 1	Bucket 2	Bucket 3	
worms	8	18	15	
millipedes	8	8	11	
beetles	9	8	17	

A. What are the variables in Grace's investigation?

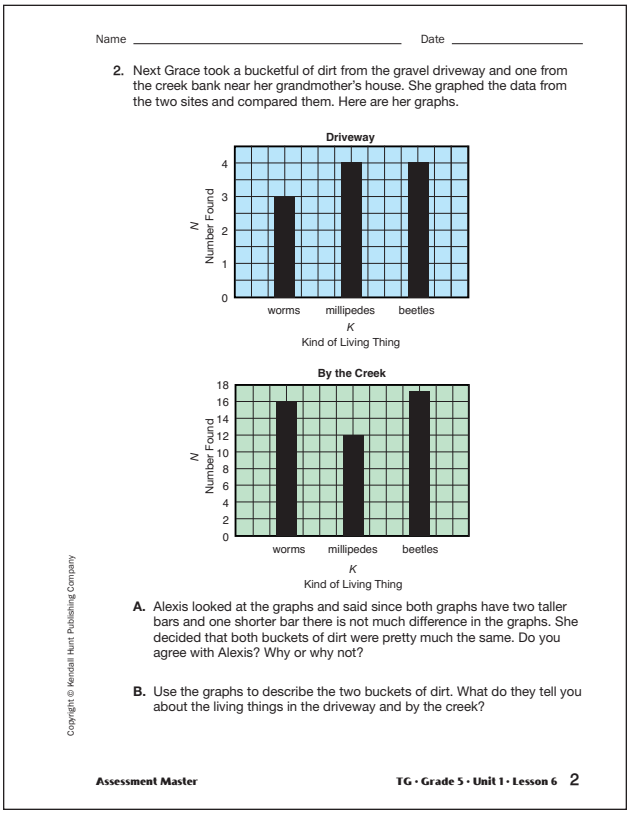
B. Are the variables categorical or numerical?

C. Find the median for the number found of each kind of living thing.

D. Use a piece of *Centimeter Graph Paper* to make a graph of Grace's data. Use the median values.

E. Grace took another bucketful of dirt from the same garden. Predict what kind of living thing she will find the most. Which do you think will be the least? Explain how you made your predictions.

***Teacher Guide* - Page 1**



Name _____ Date _____

2. Next Grace took a bucketful of dirt from the gravel driveway and one from the creek bank near her grandmother's house. She graphed the data from the two sites and compared them. Here are her graphs.

A. Alexis looked at the graphs and said since both graphs have two taller bars and one shorter bar there is not much difference in the graphs. She decided that both buckets of dirt were pretty much the same. Do you agree with Alexis? Why or why not?

B. Use the graphs to describe the two buckets of dirt. What do they tell you about the living things in the driveway and by the creek?

***Teacher Guide* - Page 2**

Name _____ Date _____

3. The students in Mr. Moreno's class are keeping track of the number of laps they run during warm-up time in gym class. They record their progress on a chart on the wall. Here is their chart after the first day.

Student's Name	Number of Laps Completed
Michael	5
Nicholas	8
Keenya	4
Grace	7
John	8
Jackie	10
Irma	6
Jessie	4
Luis	5
Frank	7
Shannon	9
Ming	9
Roberto	10
Nila	5
Ana	7
Linda	7
Jacob	6
Lee Yah	7
Tanya	5
Romesh	7
Jerome	9
Maya	6

A. If one of the variables is Number of Laps Completed, what is the second variable?

B. Are the two variables categorical or numerical? How do you know?

***Teacher Guide* - Page 3**

Name _____ Date _____

4. A. Use the data collected on the chart in Question 3 to complete the data table.

Laps Run in Gym Class

Number of Laps	_____
0	
2	
6	

B. Use *Centimeter Graph Paper* to make a bar graph representing the data collected.

5. A. What is the median number of laps that the students in Mr. Moreno's class ran on the first day? Explain how you decided.

B. How many students ran fewer than the median number of laps? How many students ran more than the median number of laps?

***Teacher Guide* - Page 4**

3. A. Number of Students

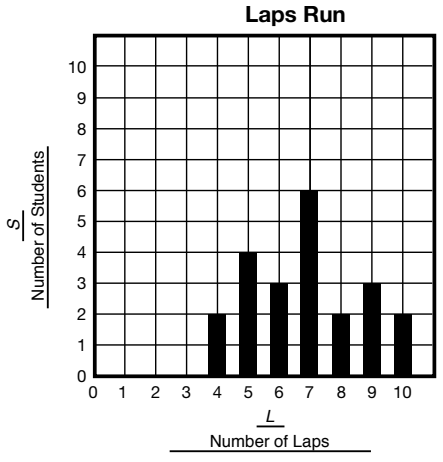
B. Both variables are numerical because both have numbers for their values.

4. A.

Laps Run in Gym Class

Number of Laps	Number of Students
0	0
1	0
2	0
3	0
4	2
5	4
6	3
7	6
8	2
9	3
10	2

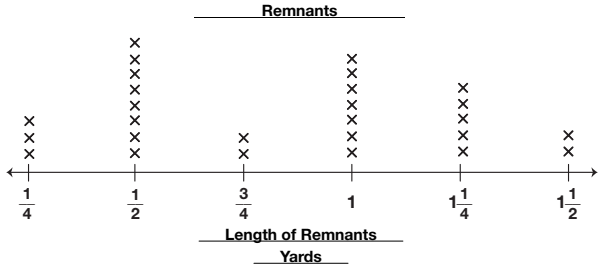
B.



5. A. 7 laps; Possible response: I know the median is the value in the middle of the data set. I used the graph and counted from the first value of 4 laps until I hit the 11th data point. I landed on the bar for 7 laps. Then I did the same starting with the last value of 10 laps and I also landed on the bar for 7 laps. The median is 7.

B. 9 students ran less than 7 laps and 7 students ran more than 7 laps.

6.



7. **A.** 27 remnants

B. 1 yard

C. $\frac{1}{2}$ yard

8. $\frac{1}{4}$ yard + $\frac{1}{2}$ yard + $\frac{3}{4}$ yard + $1\frac{1}{2}$ yards = 3 yards

$\frac{1}{4}$ yard + $\frac{1}{2}$ yard + 1 yard + $1\frac{1}{4}$ yards = 3 yards; Possible response: I started by thinking that $1\frac{1}{2}$ yards + $1\frac{1}{2}$ yards would equal 3 yards, but since I needed 4 pieces of fabric, I broke $1\frac{1}{2}$ into 3 pieces: $\frac{1}{4} + \frac{3}{4} + \frac{1}{2}$. For the second combination I started with $1\frac{1}{4} + 1 = 2\frac{1}{4}$. I knew I needed $\frac{3}{4}$ yards of fabric but it had to be in 2 pieces. Since $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ I decided to use those two pieces. My final combination was $\frac{1}{4} + 1 + \frac{1}{2} + 1\frac{1}{4}$.

Name _____ Date _____

6. Jackie is helping her grandmother organize her sewing room. She found a box of fabric remnants in the closet that her grandmother used in quilting. She sorted the remnants and made a table to show what was in the box.

Remnants

Length of Remnant in Yards	Number of Remnants
$\frac{1}{4}$	3
$\frac{1}{2}$	8
$\frac{3}{4}$	2
1	7
$1\frac{1}{4}$	5
$1\frac{1}{2}$	2

Complete the line plot to represent the data in Jackie's data table.

7. **A.** How many remnants did Jackie find in the box?

B. What is the median length of the remnants she found?

C. What is the mode for the length of the remnants?

***Teacher Guide* - Page 5**

8. Jackie's grandmother needs 4 pieces of fabric that when put together will be 3 yards in length. Each piece of fabric must be a different length. Find two different combinations of remnants that Jackie can give to her grandmother. Show or tell how you decided.

Test Your Knowledge: Using Data to Solve Problems	Expectation	Check In	Comments
Make a bar graph with categorical data. [Q# 1D]	E3		
Make a line plot or bar graph using numerical data. [Q# 4B, 6]	E4		
Read a table, line plot, or bar graph to find information about a data set. [Q# 1A–C, 3A–B, 4A, 5A–B, 7A–C]	E7		
Make predications or generalizations about a data set using a data table and graph. [Q# 1E, 2A–B, 8]	E10		

***Teacher Guide* - Page 6**