6.4 Choosing a Data Display

Learning Target: Use appropriate data displays to represent situations.

Success Criteria:
- I can choose appropriate data displays for situations.
- I can identify misleading data displays.
- I can analyze a variety of data displays.

EXPLORATION 1

Displaying Data

Work with a partner. Analyze and display each data set in a way that best describes the data. Explain your choice of display.

a. NEW ENGLAND ROADKILL A group of schools in New England participated in a two-month study. They reported 3962 dead animals.

Birds: 307
Mammals: 2746
Amphibians: 145
Reptiles: 75
Unknown: 689

b. BLACK BEAR ROADKILL The data below show the numbers of black bears killed on a state's roads each year for 20 years.

Year 1:	30	Year 8:	47	Year 15:	99
Year 2:	37	Year 9:	49	Year 16:	129
Year 3:	46	Year 10:	61	Year 17:	111
Year 4:	33	Year 11:	74	Year 18:	127
Year 5:	43	Year 12:	88	Year 19:	141
Year 6:	35	Year 13:	82	Year 20:	135
Year 7:	43	Year 14:	109		

Math Practice

Choose Tools

For each set of data, is there more than one way that you can accurately display the data?

c. RACCOON ROADKILL A one-week study along a four-mile section of road found the following weights (in pounds) of raccoons that had been killed by vehicles.

13.4	14.8	17.0	12.9
21.3	21.5	16.8	14.8
15.2	18.7	18.6	17.2
18.5	9.4	19.4	15.7
14.5	9.5	25.4	21.5
17.3	19.1	11.0	12.4
20.4	13.6	17.5	18.5
21.5	14.0	13.9	19.0

d. What can be done to minimize the number of animals killed by vehicles?

6.4 Lesson

Key Idea

Data Display	What does it do?
Pictograph	shows data using pictures
Bar Graph	shows data in specific categories
Circle Graph	shows data as parts of a whole
Line Graph	shows how data change over time
Histogram	shows frequencies of data values in intervals of the same size
Stem-and-Leaf Plot	orders numerical data and shows how they are distributed
Box-and-Whisker Plot	shows the variability of a data set by using quartiles
Dot Plot	shows the number of times each value occurs in a data set
Scatter Plot	shows the relationship between two data sets by using ordered pairs in a coordinate plane

EXAMPLE 1 Choosing an Appropriate Data Display

Choose an appropriate data display for the situation. Explain your reasoning.

a. the number of students in a marching band each year

A line graph shows change over time. So, a line graph is an appropriate data display.

b. a comparison of people's shoe sizes and their heights

You want to compare two different data sets. So, a scatter plot is an appropriate data display.

Try It

Choose an appropriate data display for the situation. Explain your reasoning.

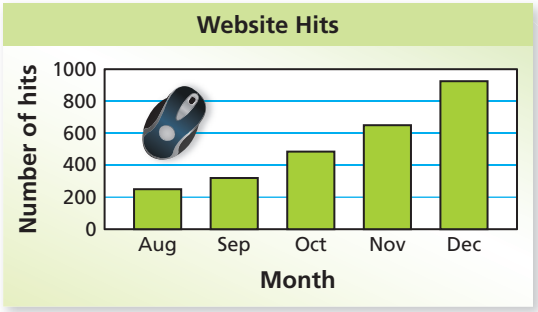
1. the population of the United States divided into age groups
2. the number of students in your school who play basketball, football, soccer, or lacrosse

EXAMPLE 2 Identifying an Appropriate Data Display

You record the number of hits for your school's new website for 5 months. Tell whether each data display is appropriate for representing how the number of hits changed during the 5 months. Explain your reasoning.

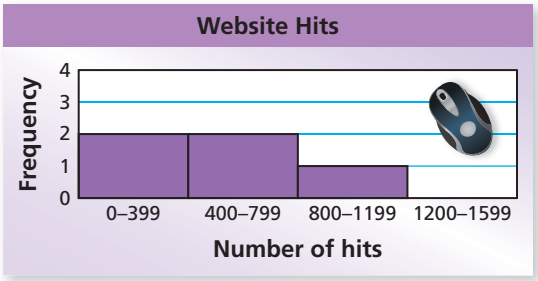
Month	Hits
August	250
September	320
October	485
November	650
December	925

a.



The bar graph shows the number of hits for each month. So, it is an appropriate data display.

b.



The histogram does not show the number of hits for each month or how the number of hits changes over time. So, it is *not* an appropriate data display.

c.

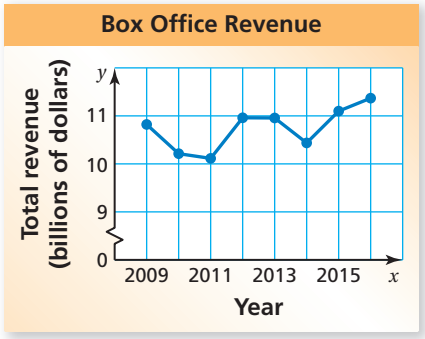
The line graph shows how the number of hits changes over time. So, it is an appropriate data display.

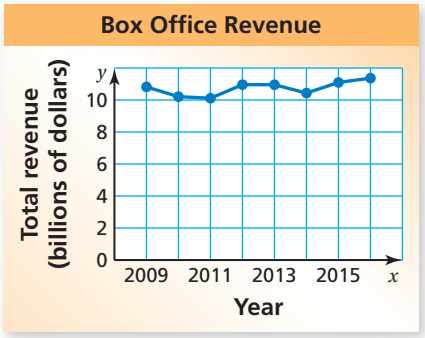
Try It **Tell whether the data display is appropriate for representing the data in Example 2. Explain your reasoning.**

3. dot plot **4.** circle graph **5.** stem-and-leaf plot

EXAMPLE 3 Identifying a Misleading Data Display

Which line graph is misleading? Explain.



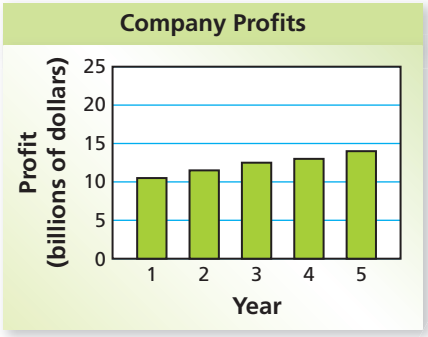


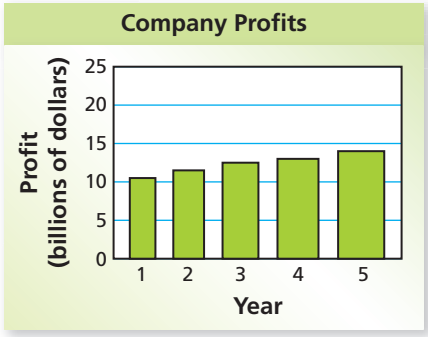
The vertical axis of the line graph on the left has a break (≒) and begins at 9. This graph makes it appear that the total revenue fluctuated drastically from 2009 to 2016. The graph on the right has an unbroken axis. It is more honest and shows that the total revenue changed much less from 2009 to 2016.

So, the graph on the left is misleading.

Try It

6. Which bar graph is misleading? Explain.





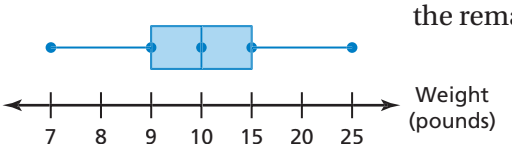
Self-Assessment for Concepts & Skills

Solve each exercise. Then rate your understanding of the success criteria in your journal.

CHOOSING A DATA DISPLAY **Choose an appropriate data display for the situation. Explain your reasoning.**

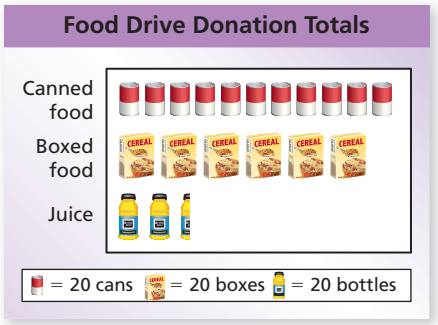
7. the percent of band students playing each instrument

8. a comparison of the amount of time spent using a tablet computer and the remaining battery life



9. **IDENTIFYING A MISLEADING DISPLAY** Is the box-and-whisker plot misleading? Explain.

EXAMPLE 4 Modeling Real Life



The organizer of a food drive creates the pictograph shown. (a) A volunteer concludes that the numbers of cans of food and boxes of food donated were about the same. Determine whether this conclusion is accurate. (b) Estimate the number of each item that has been donated.

a. Each icon represents the same number of items. Because the box icon is larger than the can icon, it looks like the number of boxes is about the same as the number of cans. The number of boxes is actually about half of the number of cans.

So, the conclusion is not accurate.

b. Each icon represents 20 items. Multiply each number of icons by 20.

$11 \times 20 = 220$ cans

$6 \times 20 = 120$ boxes

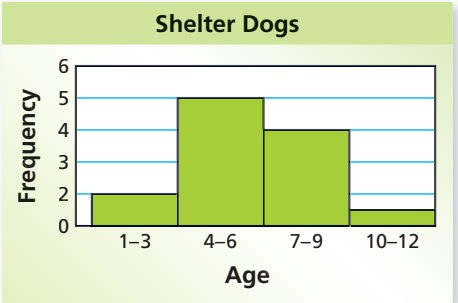
$2\frac{1}{2} \times 20 = 50$ bottles

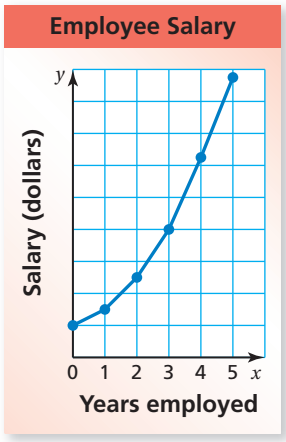
So, about 220 cans, 120 boxes, and 50 bottles have been donated.

Self-Assessment for Problem Solving

Solve each exercise. Then rate your understanding of the success criteria in your journal.

10. An employee at an animal shelter creates the histogram shown. A visitor concludes that the number of 7-year-old to 9-year-old dogs is triple the number of 1-year-old to 3-year-old dogs. Determine whether this conclusion is accurate. Explain.





11. DIG DEEPER! A business manager creates the line graph shown. (a) How do the data *appear* to change over time? Explain why this conclusion may not be accurate. (b) Why might the business manager want to use this line graph?

6.4 Practice

Go to **BigIdeasMath.com** to get HELP with solving the exercises.

Review & Refresh

You randomly survey students about whether they recycle. The two-way table shows the results.

		Recycle	
		Yes	No
Gender	Female	28	9
	Male	24	14

1. How many male students recycle? How many female students do *not* recycle?
2. Find and interpret the marginal frequencies.

Find the slope and the y-intercept of the graph of the linear equation.

3. $y = 4x + 10$
4. $y = -3.5x - 2$
5. $y - 8 = -x$

Concepts, Skills, & Problem Solving

6. **DISPLAYING DATA** Analyze and display the data in a way that best describes the data. Explain your choice of display. (See Exploration 1, p. 255.)

Notebooks Sold in One Week		
192 red	170 green	203 black
183 pink	230 blue	165 yellow
210 purple	250 orange	179 white

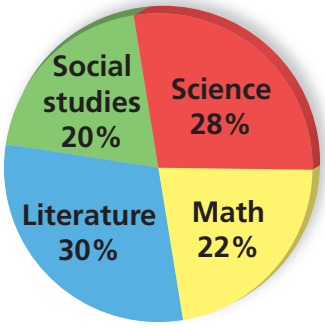
CHOOSING A DATA DISPLAY **Choose an appropriate data display for the situation. Explain your reasoning.**

7. a student's test scores and how the scores are spread out
8. the prices of different televisions and the numbers of televisions sold
9. the outcome of rolling a number cube
10. the distance a person drives each month

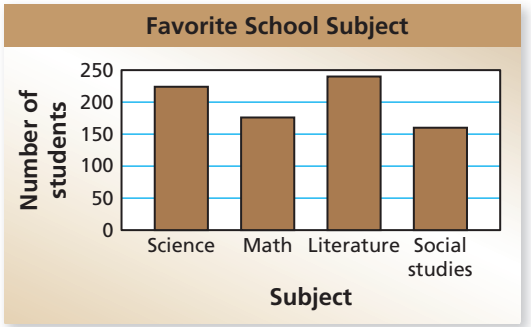
11. **IDENTIFYING AN APPROPRIATE DISPLAY** A survey asked 800 students to choose their favorite school subject. The results are shown in the table. Tell whether each data display is appropriate for representing the portion of students who prefer math. Explain your reasoning.

Favorite School Subject	
Subject	Number of Students
Science	224
Math	176
Literature	240
Social studies	160

a. Favorite School Subject



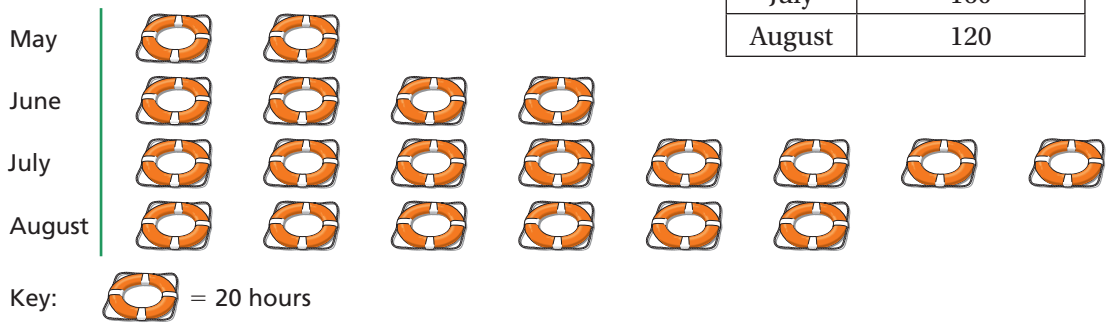
b.



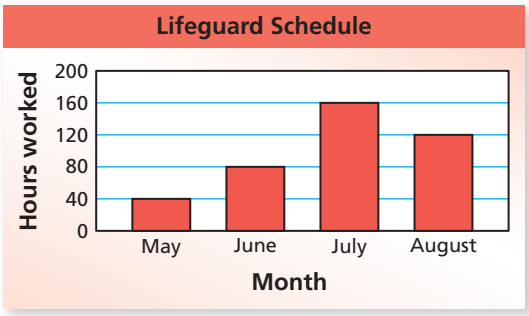
12. IDENTIFYING AN APPROPRIATE DISPLAY The table shows how many hours you worked as a lifeguard from May to August. Tell whether each data display is appropriate for representing how the number of hours worked changed during the 4 months. Explain your reasoning.

Lifeguard Schedule	
Month	**Hours Worked**
May	40
June	80
July	160
August	120

a.



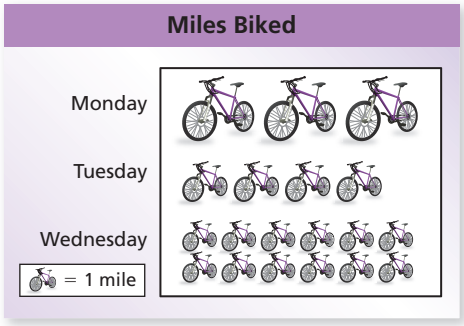
b.

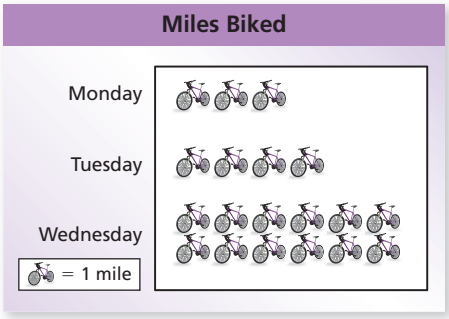


13. WRITING When should you use a histogram instead of a bar graph to display data? Use an example to support your answer.

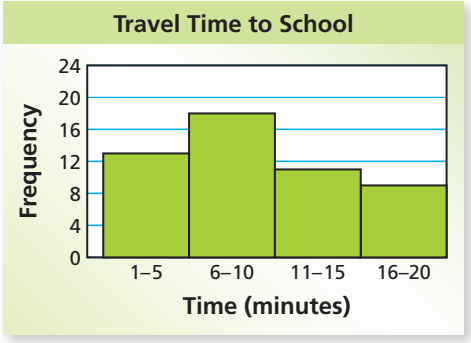
IDENTIFYING MISLEADING DISPLAYS **Which data display is misleading? Explain.**

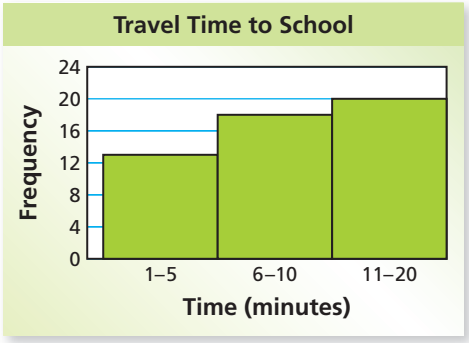
14.



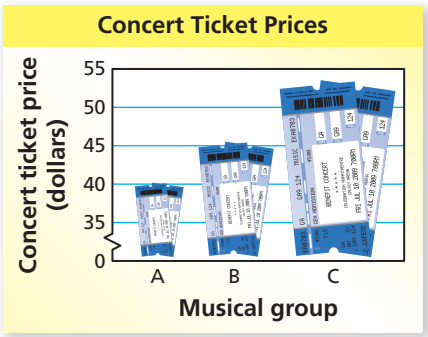


15.



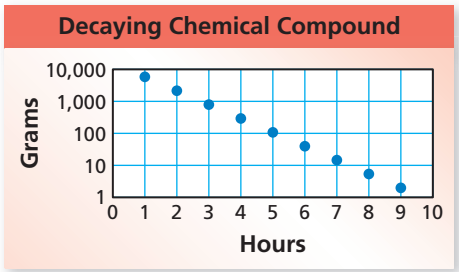


16. **REASONING** What type of data display is appropriate for showing the mode of a data set?



17. **CRITICAL THINKING** The director of a music festival creates the data display shown. A customer concludes that the ticket price for Group C is more than double the ticket price for Group A. Determine whether this conclusion is accurate. Explain.

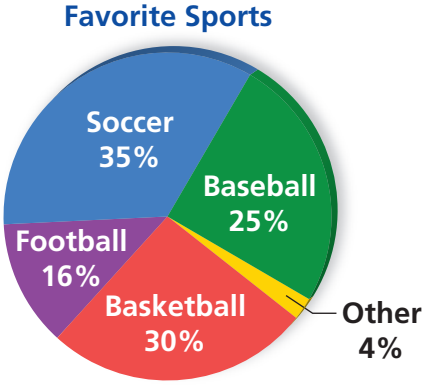
18. **PATTERNS** A scientist gathers data about a decaying chemical compound and creates the scatter plot shown.



a. The scientist concludes that there is a negative linear relationship between the data. Determine whether this conclusion is accurate. Explain.

b. Estimate the amount of the compound remaining after 1 hour, 3 hours, 5 hours, and 7 hours.

19. **REASONING** A survey asks 100 students to choose their favorite sports. The results are shown in the circle graph.



a. Explain why the graph is misleading.

b. What type of data display is more appropriate for the data? Explain.

20. **STRUCTURE** With the help of computers, mathematicians have computed and analyzed trillions of digits of the irrational number π. One of the things they analyze is the frequency of each of the numbers 0 through 9. The table shows the frequency of each number in the first 100,000 digits of π.

a. Display the data in a bar graph.

b. Display the data in a circle graph.

c. Which data display is more appropriate? Explain.

d. Describe the distribution.

Number	0	1	2	3	4	5	6	7	8	9
Frequency	9999	10,137	9908	10,025	9971	10,026	10,029	10,025	9978	9902