9.4 Choosing a Data Display

Essential Question How can you display data in a way that helps you make decisions?

1 ACTIVITY: 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. ROADKILL A group of schools in New England participated in a 2-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 from 1993 to 2012.

1993:	30	2000:	47	2007:	99
1994:	37	2001:	49	2008:	129
1995:	46	2002:	61	2009:	111
1996:	33	2003:	74	2010:	127
1997:	43	2004:	88	2011:	141
1998:	35	2005:	82	2012:	135
1999:	43	2006:	109		

c. RACCOON ROADKILL A 1-week study along a 4-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 do you think can be done to minimize the number of animals killed by vehicles?

Common Core

Data Analysis

In this lesson, you will

- choose appropriate data displays.
- identify and analyze misleading data displays.

Applying Standard 8.SP.1

2 ACTIVITY: Statistics Project

Math Practice 4

Use a Graph

How can you use a graph to represent the data you have gathered for your report? What does the graph tell you about the data?

ENDANGERED SPECIES PROJECT **Use the Internet or some other reference to write a report about an animal species that is (or has been) endangered. Include graphical displays of the data you have gathered.**

Sample: Florida Key Deer

In 1939, Florida banned the hunting of Key deer. The numbers of Key deer fell to about 100 in the 1940s.

In 1947, public sentiment was stirred by 11-year-old Glenn Allen from Miami. Allen organized Boy Scouts and others in a letter-writing campaign that led to the establishment of the National Key Deer Refuge in 1957. The approximately 8600-acre refuge includes 2280 acres of designated wilderness.

The Key Deer Refuge has increased the population of Key deer. A recent study estimated the total Key deer population to be approximately 800.

About half of Key deer deaths are due to vehicles.

One of two Key deer wildlife underpasses on Big Pine Key

What Is Your Answer?

3. **IN YOUR OWN WORDS** How can you display data in a way that helps you make decisions? Use the Internet or some other reference to find examples of the following types of data displays.

- Bar graph
- Circle graph
- Scatter plot
- Stem-and-leaf plot
- Box-and-whisker plot

Practice Use what you learned about choosing data displays to complete Exercise 3 on page 397.

9.4 Lesson

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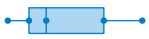
Key Idea

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.

On Your Own

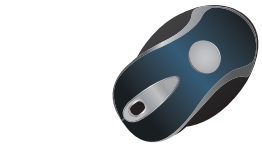
Now You're Ready
Exercises 4–7

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

1. the population of the United States divided into age groups
2. the percents 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 the data display is appropriate for representing how the number of hits changed during the 5 months. Explain your reasoning.

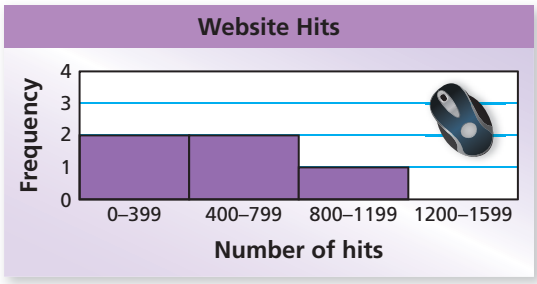


Month	Hits
August	250
September	320
October	485
November	650
December	925

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.

On Your Own

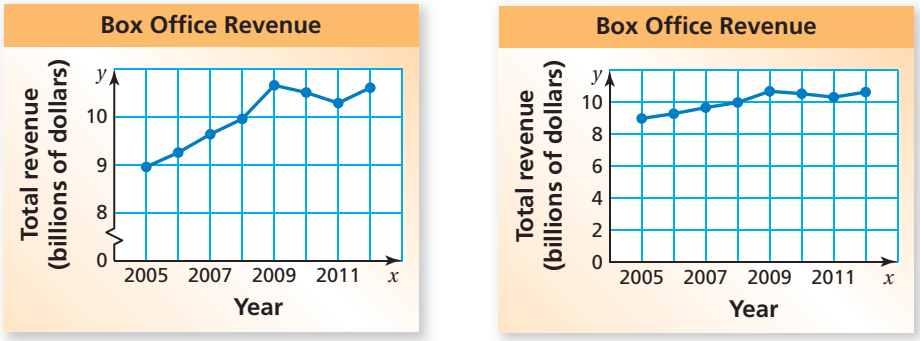
Now You're Ready
Exercises 8 and 9

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

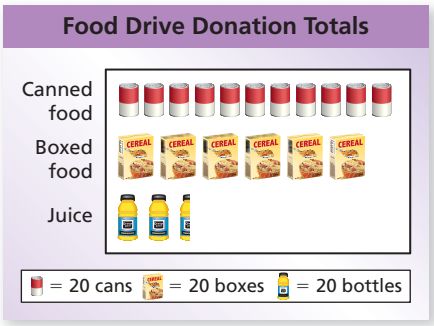
Which line graph is misleading? Explain.



The vertical axis of the line graph on the left has a break (≑) and begins at 8. This graph makes it appear that the total revenue increased rapidly from 2005 to 2009. The graph on the right has an unbroken axis. It is more honest and shows that the total revenue increased slowly.

∴ So, the graph on the left is misleading.

EXAMPLE 4 Analyzing a Misleading Data Display



A volunteer concludes that the numbers of cans of food and boxes of food donated were about the same. Is this conclusion accurate? Explain.

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. But the number of boxes is actually about half of the number of cans.

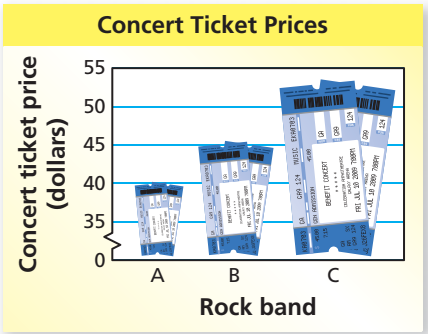
∴ So, the conclusion is not accurate.

On Your Own

Now You're Ready
Exercises 11–14

Explain why the data display is misleading.

6.



7.

9.4 Exercises

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Help with Homework
BigIdeasMath.com

Vocabulary and Concept Check

1. **REASONING** Can more than one display be appropriate for a data set? Explain.
2. **OPEN-ENDED** Describe how a histogram can be misleading.

Practice and Problem Solving

3. Analyze and display the data in a way that best describes the data. Explain your choice of display.

Notebooks Sold in One Week				
192 red	170 green	203 black	183 pink	230 blue
165 yellow	210 purple	250 orange	179 white	218 other

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

1 4. a student's test scores and how the scores are spread out

5. the distance a person drives each month

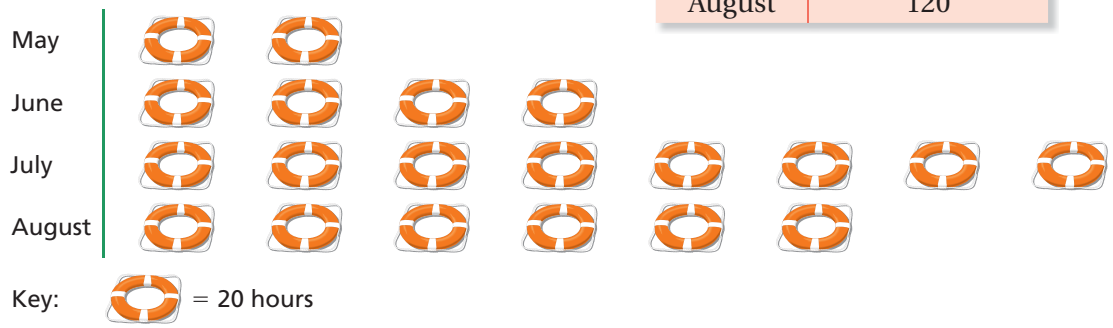
6. the outcome of rolling a number cube

7. homework problems assigned each day

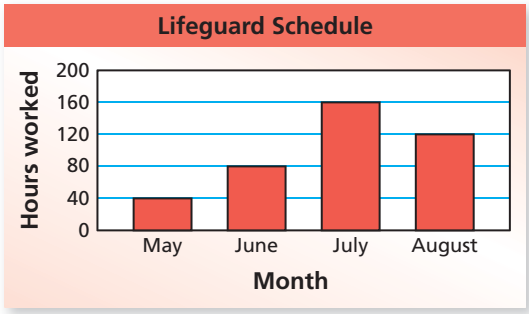
2 8. **LIFEGUARD** The table shows how many hours you worked as a lifeguard from May to August. Tell whether the data display is appropriate for representing how the number of hours worked changed during the 4 months. Explain your reasoning.

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

a.



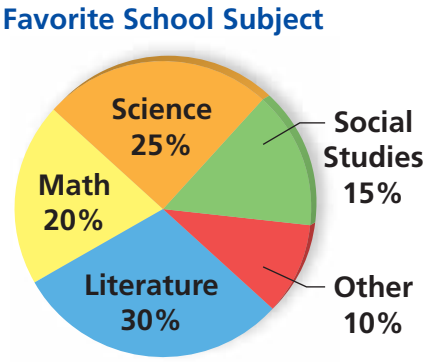
b.



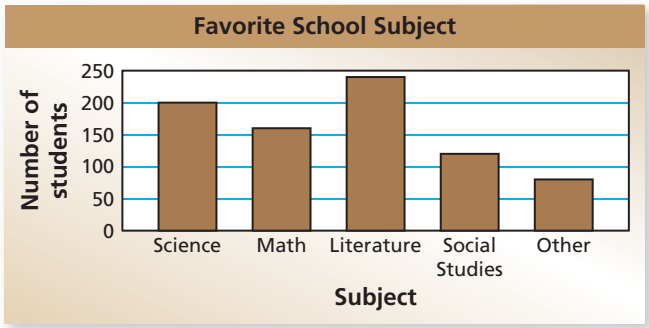
9. FAVORITE SUBJECT A survey asked 800 students to choose their favorite subject. The results are shown in the table. Tell whether the data display is appropriate for representing the portion of students who prefer math. Explain your reasoning.

Favorite School Subject	
Subject	**Number of Students**
Science	200
Math	160
Literature	240
Social Studies	120
Other	80

a.



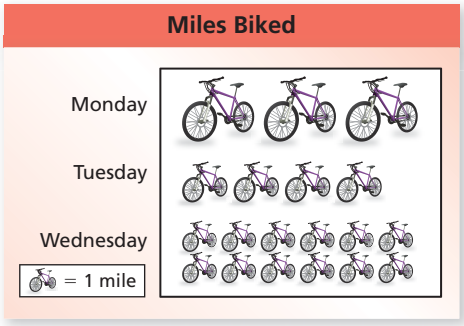
b.



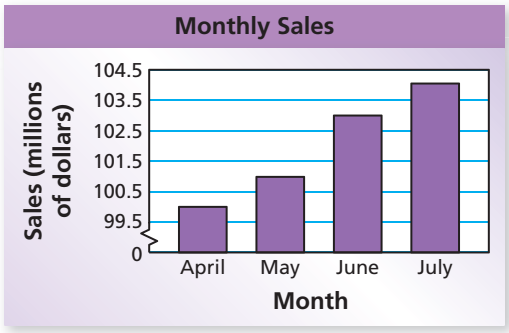
10. WRITING When should you use a histogram instead of a bar graph to display data? Use an example to support your answer.

Explain why the data display is misleading.

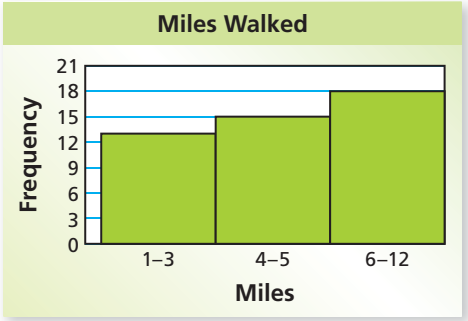
3 4 **11.**



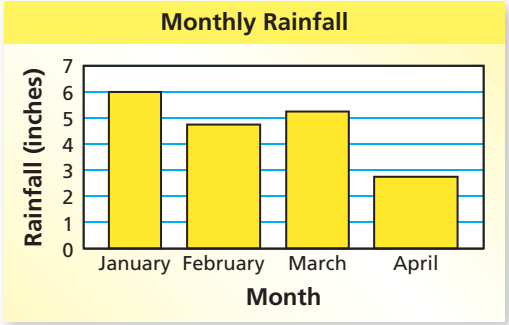
12.



13.

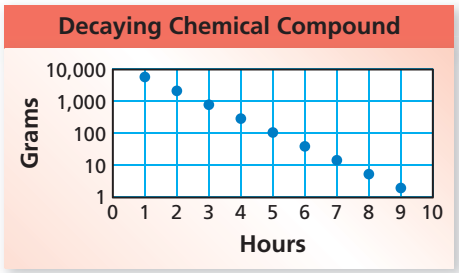


14.



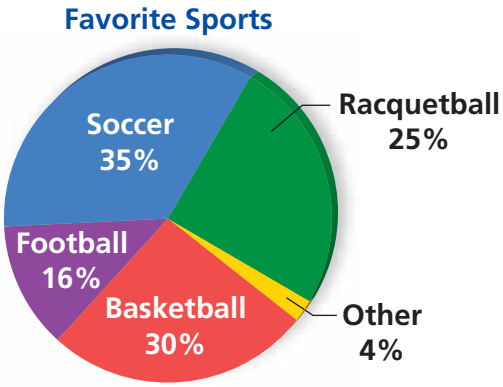
15. VEGETABLES A nutritionist wants to use a data display to show the favorite vegetables of the students at a school. Choose an appropriate data display for the situation. Explain your reasoning.

16. CHEMICALS A scientist gathers data about a decaying chemical compound. The results are shown in the scatter plot. Is the data display misleading? Explain.



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

18. SPORTS A survey asked 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 would be more appropriate for the data? Explain.

19. Structure With the help of computers, mathematicians have computed and analyzed billions 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

Fair Game Review What you learned in previous grades & lessons

Estimate the square root to the nearest (a) integer and (b) tenth. *(Section 7.4)*

20. $\sqrt{20}$ **21.** $-\sqrt{74}$ **22.** $\sqrt{140}$

23. MULTIPLE CHOICE What is 20% of 25% of 400? *(Skills Review Handbook)*

(A) 20 (B) 200 (C) 240 (D) 380