Appropriate Data Displays

Key Concept

Different data displays have different purposes. In this lesson, students consider when to use various types of graphs. They also examine the characteristics that can make a graph misleading and evaluate data displays in the media.

Vocabulary

Data Displays When you discuss the chart *Using Appropriate Data Displays* on page 62, pose questions that will help students connect the information in the chart to the vocabulary they learned in Lesson 12. For example, ask students which displays may be used for qualitative data, which displays may be used for univariate data, and so on.

Key Question: Example 1

What can you conclude from the fact that the "box" part of the graph is shorter for team B than for team A?
The middle 50% of the data is clustered more closely around the median for team B than for team A.

Key Question: Example 2

How do you find the angle for the section of the graph that represents the area of Asia?
Divide the area of Asia (17.2) by the total area of the continents (57) and multiply by 360°.

Avoiding Common Errors

Example 2 Students may have difficulty deciding whether to display the data in a bar graph or circle graph. Although it is reasonable to display the data in a bar graph, point out that the problem talks about comparing the area of each continent to the *total* area of the continents. The word *total* is a clue that a circle graph is a more appropriate choice for the display.

Key Question: Example 3

During which 2-hour period was the snowfall heaviest? How is this reflected in the graph?
The snowfall was heaviest from 4:01 P.M. to 6:00 P.M. This segment of the graph is the steepest.

Key Question: Example 4

Who might create the misleading graph in part a? Why?
Someone who sells advertising space in morning newspapers might create this graph to give potential advertisers the impression that the circulation for morning newspapers is increasing rapidly.

Key Question: Example 5

Who might create the misleading circle graph? Why?
The coach of a 9th grade sports team might create the graph to hide the fact that participation by 9th graders is much lower than that for other grades.

Closing the Lesson

Have students answer the following question: What are some different ways to make a data display misleading?
Include a break in the vertical axis, choose an inappropriate scale for the vertical axis, combine data categories in a circle graph, and so on.

Teaching Strategy

Exercise 14 Using a spreadsheet makes it possible to experiment with a variety of displays for a single set of data. To extend this exercise, have students try making data displays that include some of the special visual effects included in most spreadsheet programs. For example, students might use three-dimensional cylinders for their bar graphs. Ask students if these effects tend to increase or decrease the accuracy of the displays.

Homework Help	Homework Check
Example 1: Exs. 3, 7	To quickly check student understanding of key concepts, go over the following exercises: 3, 4, 5, 15, 17.
Example 2: Exs. 2, 4, 8	
Example 3: Exs. 1, 5, 11	
Example 4: Exs. 15, 16, 18, 19	
Example 5: Ex. 17	
Enrichment: Exs. 6, 9, 10, 12–14	

✔ Check Answers

1.

Heights of Players on Team A

Heights of Players on Team B
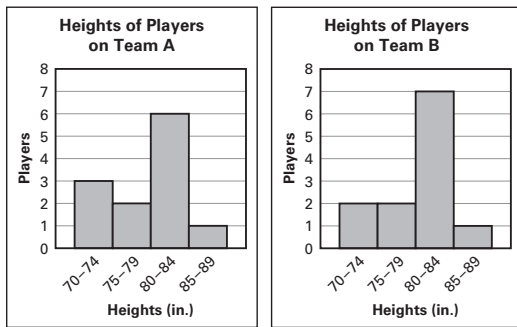
In each display, the 80–84 inch interval contains the heights of the most players.

2.

Areas of Continents
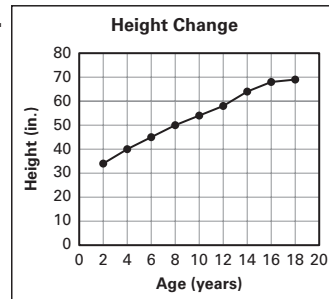
3.

Total Amount Spent on Lunch Over 1 Week
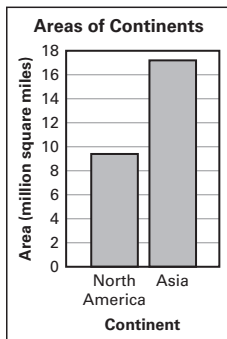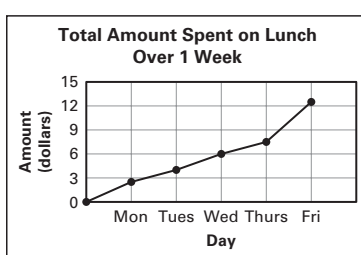
4. Because the intervals of the scale of the vertical axis are larger than necessary, it appears as though the numbers of families with each number of pets are all about equal.

5. Because the intervals contain such a wide range of ages, the graph does not give a detailed description of the players' ages.

6. Because the 3–4 interval is split in half, it appears that most of the restaurant ratings are in the 7–8 interval. This is not true. There are as many ratings in the 3–4 interval as in the 7–8 interval.
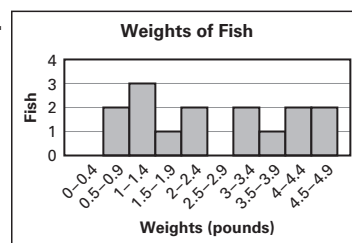

Restaurant Ratings

Exercise Answers

1. line graph

2. bar graph

3. box-and-whisker plot

4. circle graph

5.

Height Change

6.

Weights of Fish

7.

8.

Preferred Marketing Methods
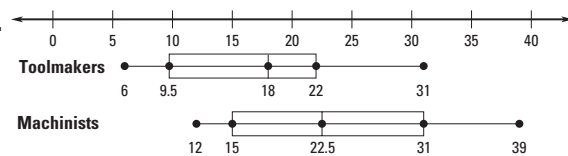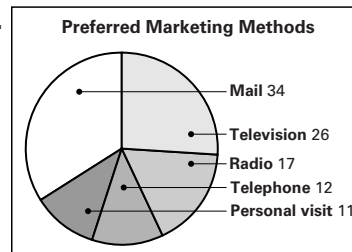
Mail 34
Television 26
Radio 17
Telephone 12
Personal visit 11

9. No, a stem-and-leaf plot would not be a helpful way to organize this information, because there are rarely ten or more people in a household.

10. Yes, a line graph would be helpful in this case. A line graph is a good way to organize information about change over a measurable dimension (in this case, height).

11.

Baseball's Height vs. Time
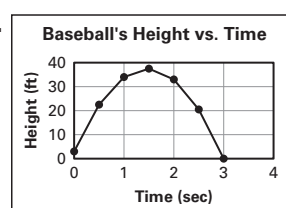
12.
```
5 | 1 4 5 7 9
6 | 0 1 2 5 6 7
7 | 1 3 4 5 7 8
8 | 0 4 6        Key: 5|4 = 54
```

13.
```
5 | 2 4 5 8 9
6 | 3 6
7 | 0 2 7
8 | 3 5 8
9 | 1 8              Key: 7|2 = 72
```
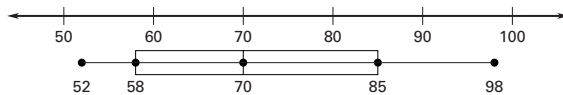

The stem-and-leaf plot organizes the data into intervals of 10 (50–59, 60–69, and so on). The box-and-whisker plot organizes the data into quartiles.

14. Check students' work.

15. The graph could be misleading because it has a broken vertical axis. The graph could be redrawn with no break in the vertical axis.

16. The graph could be misleading because the intervals of the scale of the vertical axis are larger than necessary. The graph could be redrawn with the scale of the vertical axis having intervals of $100.

17. The graph could be misleading because it leaves out a category of responses.
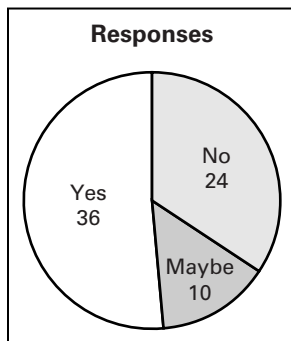
18. Both graphs could be misleading. Graph A gives a misleading impression of the data because the intervals of the scale of the vertical axis are larger than necessary. Graph B gives a misleading impression of the data because there is a break in its vertical axis.

19. Because the graphs have different vertical scales, they might lead you to conclude that the team won many more games each month than it lost. Actually, there were some months when the team lost more games than it won.