

8. You have a list of the average gasoline price for each month during the past year. Which type of display would be most appropriate for these data?
- a. a bar graph b. a pie chart c. a line chart
9. A histogram is
- a. a graph that shows how some quantity has changed through history.
- b. a graph that shows cumulative frequencies.
- c. a bar chart for quantitative data.
10. You have a histogram and you want to convert it into a line chart. A good first step would be to
- a. make a list of all the categories in alphabetical order.
- b. place a dot at the top of each bar, in the center of the bar.
- c. calculate all the relative frequencies that you can read from the histogram.

Exercises

REVIEW QUESTIONS

1. What is a frequency table? Explain what we mean by the categories and frequencies. What do we mean by relative frequency? What do we mean by cumulative frequency?
2. What is the distinction between qualitative data and quantitative data? Give a few examples of each.
3. What is the purpose of binning? Give an example in which binning is useful.
4. What two types of graphs are most common when the categories are qualitative data? Describe the construction of each.
5. Describe the importance of labeling on a graph, and briefly discuss the kinds of labels that should be included on graphs.
6. What two types of graphs are most common when the categories are quantitative data? Describe the construction of each.

DOES IT MAKE SENSE?

Decide whether each of the following statements makes sense (or is clearly true) or does not make sense (or is clearly false). Explain your reasoning.

7. I made a frequency table with two columns, one labeled *State* and one labeled *State Capitol*.
8. The relative frequency of B grades in our class was 0.3.
9. Your bar graph must be wrong, because your bars are wider than the ones shown on the teacher's answer key.
10. Your bar graph must be wrong, because it shows different frequencies than the ones shown on the teacher's answer key.
11. Your pie chart must be wrong, because you have the 45% frequency wedge near the upper left and the answer key shows it near the lower right.
12. Your pie chart must be wrong, because when I added the percentages on your wedges, they totaled 124%.
13. I was unable to make a bar chart, because the data categories were qualitative rather than quantitative.
14. I rearranged the bars on my histogram so that the tallest bar would come first.

BASIC SKILLS & CONCEPTS

15–16: Frequency Tables. Make frequency tables for the following data sets. Include columns for relative frequency and cumulative frequency.

15. Final grades of 20 students in a math class:

AA BBBB CCCCCCCC DDD FF

16. A Web site that reviews recent movies lists 5 five-star films (the highest rating), 10 four-star films, 20 three-star films, 15 two-star films, and 5 one-star films.

17–24: Qualitative vs. Quantitative. Determine whether the following variables are qualitative or quantitative.

17. The birth months of individuals
18. The responses on a questionnaire: 0 = strongly disagree, . . . , 5 = strongly agree
19. The yes/no responses on a ballot initiative to the question "Do you support an increase in the sales tax?"
20. The amount of rainfall in each month of a year in Chattanooga, Tennessee
21. The flavors of ice cream sold in a shop
22. The breeds of 120 purebred dogs
23. The annual salaries of major league baseball players
24. The gold medal count of each team in the 2010 Olympics

25–26: Binned Frequency Tables. Use the given bin sizes to make a frequency table for the following data set:

89 67 78 75 64 70 83 95 69 84
77 88 98 90 92 68 86 79 60 96

Include columns for relative frequency and cumulative frequency.

25. Use 5-point bins (95 to 99, 90 to 94, etc.).
26. Use 10-point bins (90 to 99, 80 to 89, etc.).
27. Largest States. Make a bar graph of the populations of the five most populous states (shown on the next page for 2008), with the bars in descending order.

State	Population
California	36.6 million
Texas	23.9 million
New York	19.3 million
Florida	18.3 million
Illinois	12.9 million

28. **Meat Producers.** Make a bar graph of beef production of the five largest beef-producing nations in the world (data below), with the bars in descending order.

Country	Amount of Beef (millions of metric tons)
U.S.	12.0
Brazil	7.9
China	7.6
Argentina	2.8
India	2.8

29–30: **Pie Charts.** Construct pie charts for the following data sets. The first step is to compute a percentage for each category in the data set.

29. The annual sales (in millions of dollars) of the leading chocolate brands are shown in the table.

Company	Sales (\$ millions)
M&Ms	253
Hershey's	186
Hershey's Kisses	114
Dove	112
All others	1377

30. The five leading tourist destinations (in millions of visitors) are shown in the table.

Country	Visitors (millions)
France	81.9
Spain	59.2
U.S.	56.0
China	54.7
Italy	43.7

31. **Government Income.** The pie chart in Figure 4.12 on p. 284 shows the makeup of federal government receipts. Make a bar graph for these data.

32. **Government Spending.** The pie chart in Figure 4.13 on p. 284 shows the makeup of federal government spending. Make a bar graph for these data.

33. **Oscar-Winning Actors.** The following data show ages of Academy Award-winning actors from 1985 to 2008. Make a frequency table for these data using bins of 20–29, 30–39, and so on. Then draw a histogram to display the binned data.

36 62 43 51 32 42 54 52 37 38 32 45
60 46 40 36 47 29 43 37 38 45 50 48

34. **Oscar Winners.** In words, contrast the graphs in Example 7 (for actresses) with the one you drew in Exercise 33. Do actors appear to be more likely to win Oscars when they are younger, older, or neither? Do you think these graphs indicate any difference in how movie makers treat male and female performers? Defend your opinion.

35. **Homicide Rates.** Study Figure 5.10. Write one to two paragraphs summarizing how the homicide rate has changed with time since 1960.

36. **Death Rates.** Figure 5.13 shows overall death rates in the United States during the 20th century. Note that the spike in 1919 was due to a worldwide epidemic of influenza. Write a few sentences summarizing the overall trend, describing how much the death rate changed during the century, and putting the 1919 spike into context in terms of its impact on the population.

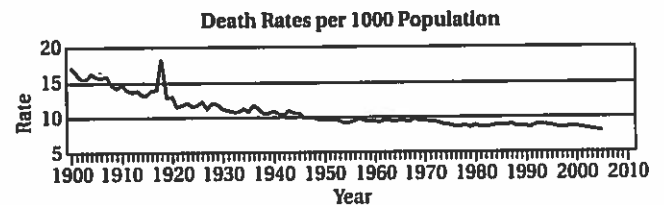


FIGURE 5.13 Source: National Center for Health Statistics.

FURTHER APPLICATIONS

37–45: **Statistical Graphs.** Consider the following data sets.

a. State whether the variables are qualitative or quantitative.

b. Draw a bar graph or a pie chart if the data are qualitative. Draw a histogram or a line chart if the data are quantitative.

c. Write a paragraph discussing interesting features of the data revealed by your display.

37. The following frequency table categorizes Nobel Prize winners in literature from 1990 through 2005 by their age at the time they received the award.

Age	Number of Winners
<58	1
58–59	2
60–61	1
62–63	3
64–65	0
66–67	1
68–69	3
70–71	1
72–73	2
74–75	2
76–77	2
>77	1