Review Exercises

Section 1.1

In Exercises 1–4, identify the population and the sample.

1. A survey of 898 U.S. adult VCR owners found that 16% had VCR clocks that were currently blinking "12:00." *(Source: Wirthlin Worldwide)*
2. Thirty-eight nurses working in the San Francisco area were surveyed concerning their opinions of managed health care.
3. A study of 82,188 U.S. ATMs (automated teller machines) found that the average surcharge for withdrawals from a competing bank was $1.48. *(Source: Dove Consulting Group, Inc.)*
4. A survey of 787 small-business managers found that 72% are optimistic about the future of their company. *(Source: OPEN Small Business Network)*

In Exercises 5–8, determine whether the numerical value describes a parameter or a statistic.

5. The 2003 team payroll of the Baltimore Orioles was $69,452,275. *(Source: Associated Press)*
6. In a survey of a sample of U.S. adults, 62% owned a portable cellular phone. *(Source: Scarborough Research)*
7. In a recent survey at the University of Arizona, 89 students were majoring in astronomy. *(Source: University of Arizona Student Research Office)*
8. Nineteen percent of a sample of Indiana ninth graders surveyed smoked cigarettes daily. *(Source: Indiana University)*
9. Which part of the study described in Exercise 3 represents the descriptive branch of statistics? Make an inference based on the results of the study.
10. Which part of the survey described in Exercise 4 represents the descriptive branch of statistics? Make an inference based on the results of the survey.

Section 1.2

In Exercises 11–14, determine which data are qualitative data and which are quantitative data. Explain your reasoning.

11. The monthly salaries of the employees at an accounting firm
12. The Social Security numbers of the employees at an accounting firm
13. The ages of a sample of 350 residents of nursing homes
14. The zip codes of a sample of 350 residents of nursing homes

In Exercises 15–18, identify the data set's level of measurement. Explain your reasoning.

15. The daily high temperatures (in degrees Fahrenheit) for Mohave, Arizona, for a week in June are listed. *(Source: Arizona Meteorological Network)*

    93 91 86 94 103 104 103

1. Population: Collection of all U.S. adult VCR owners
   Sample: Collection of the 898 U.S. adult VCR owners that were sampled
2. Population: Collection of all nurses in San Francisco area
   Sample: Collection of 38 nurses in San Francisco area that were sampled
3. Population: Collection of all U.S. ATMs
   Sample: Collection of 82,188 ATMs that were sampled
4. Population: Collection of all small-business managers
   Sample: Collection of 787 small-business managers that were sampled
5. Parameter
6. Statistic
7. Parameter
8. Statistic
9. The statement "the average surcharge for withdrawals from a competing bank was $1.48" is an application of descriptive statistics.
   An inference drawn from the sample is that all ATMs charge an average of $1.48 for withdrawals from a competing bank.
10. The statement "72% are optimistic about the future of their company" is an application of descriptive statistics.
    An inference drawn from the sample is that 72% of all small-business managers are optimistic about the future of their company.
11. Quantitative, because monthly salaries are numerical measurements.
12. Qualitative because Social Security numbers are merely labels for employees.
13. Quantitative, because ages are numerical measurements.
14. Qualitative because zip codes are merely labels for nursing homes.
15. Interval. It makes no sense saying that 100 degrees is twice as hot as 50 degrees.

16. Ordinal. The data are categorical but could be arranged in order of car size.
17. Nominal. The data are categorical and cannot be arranged in a meaningful order.
18. Ratio. The data are numerical, and it makes sense to say one player is twice as tall as another player.
19. Take a census because judges keep accurate records of charitable donations.
20. Perform a simulation because it is impractical to create this situation.
21. Perform an experiment because you want to measure the effect of a treatment on chrysanthemums.
22. Take a sample because asking every college student about space exploration would be nearly impossible.
23. Simple random sampling is used because random telephone numbers were generated and called.
24. Convenience sampling is used because the student sampled a convenient group of friends.
25. Cluster sampling is used because each community is considered a cluster and every pregnant woman in a selected community is surveyed.
26. Systematic sampling is used because every tenth car is measured.
27. Stratified sampling is used because 25 students are randomly selected from each grade level.
28. See Selected Answers, page A89.
29. Telephone sampling samples only individuals who have telephones, are available, and are willing to respond.
30. See Selected Answers, page A89.
31. The selected communities may not be representative of the entire area.
32. See Selected Answers, page A89.

16. The EPA size classes for a sample of automobiles are listed.

subcompact compact midsize large compact large

17. The four departments of a motor company are listed.

Sales Service Parts Body Shop

18. The heights (in inches) of the 2003–2004 Chicago Bulls are listed. *(Source: National Basketball Association)*

82 76 85 77 83 81 79 80 77 75 80 80 81 74 81

Section 1.3

In Exercises 19–22, decide which method of data collection you would use to collect data for the study. Explain your reasoning.

19. A study of charitable donations of the judges in Sioux Falls, South Dakota

20. A study of the effect of kangaroos on the Florida Everglades ecosystem

21. A study of the effects of a plant hormone on chrysanthemums

22. A study of college students' opinions on space exploration

In Exercises 23–28, identify which sampling technique was used in the study. Explain your reasoning.

23. Calling randomly generated telephone numbers, a study asked 1001 U.S. adults which medical conditions could be prevented by their diet. *(Adapted from Wirthlin Worldwide)*

24. A student asks 18 friends to participate in a psychology experiment.

25. A pregnancy study in Cebu, Philippines, randomly selected 33 communities from the Cebu metropolitan area, then interviewed all available pregnant women in these communities. *(Adapted from Cebu Longitudinal Health and Nutrition Survey)*

26. Law enforcement officials use a radar gun to measure the speed of every tenth vehicle on an interstate.

27. Twenty-five students are randomly selected from each grade level at a high school and surveyed about their study habits.

28. A journalist interviews 123 people after they leave a restaurant and asks them how confident they are that the food is safe.

In Exercises 29–32, identify a bias or error that might occur in the indicated survey or study.

29. The phone survey in Exercise 23

30. The psychology experiment in Exercise 24 Asking Friends is the bias

31. The pregnancy study in Exercise 25

32. The vehicle speed sampling in Exercise 26

every 10th vehicle could be speeding, or not speeding for each of the vehicles in the sample.

Chapter Quiz

Take this quiz as you would take a quiz in class. After you are done, check your work against the answers given in the back of the book.

1. Identify the population and the sample in the following study.

A study of 254 patients with sleep disorders was conducted to find a link between obesity and sleep disorders.

2. Determine whether the numerical value is a parameter or a statistic.

(a) In a survey of a sample of parents, 53% said they protect their children from sun exposure using sunscreen. *(Source: Morbidity and Mortality Weekly Report)*

(b) In a union's vote, 67% of all union members voted to ratify a contract proposal.

3. Determine whether the data are qualitative or quantitative.

(a) A database of student identification numbers

(b) The test scores in a statistics class

4. Identify each data set's level of measurement. Explain your reasoning.

(a) A list of the uniform numbers retired by each major league baseball team

(b) The number of products sold by a toy manufacturer each quarter for the current fiscal year

(c) The finishing times of the runners in the Boston marathon

5. Decide which method of data collection you would use to gather data for each study. Explain your reasoning.

(a) A study on the effect of low dietary intake of vitamin C and iron on lead levels in adults

(b) The ages of people living within 500 miles of your home

6. Identify which sampling technique was used in each study. Explain your reasoning.

(a) A journalist goes to a beach to ask people how they feel about water pollution.

(b) For quality assurance, every fifth engine part is selected from an assembly line and tested for durability.

(c) A study on attitudes about smoking is conducted at a college. The students are divided by class (freshman, sophomore, junior, and senior). Then a random sample is selected from each class and interviewed.

7. Which sampling technique used in Exercise 6 could lead to a biased study?

8. Determine whether each statement is true or false. If it is false, rewrite it as a true statement.

(a) A parameter is a numerical measure that describes a sample characteristic.

(b) Ordinal data represent the highest level of measurement.

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1. Population: Collection of all individuals with sleep disorders
   Sample: Collection of 254 patients in study
2. (a) Statistic (b) Parameter
3. (a) Qualitative (b) Quantitative
4. (a) Nominal, because no mathematical computations can be made.
   (b) Ratio, because one data value can be expressed as a multiple of another.
   (c) Interval, because meaningful differences between entries can be calculated but a zero entry is not an inherent zero.
5. (a) Perform an experiment because you want to measure the effect of a treatment on lead levels in adults.
   (b) Use sampling because it would be impossible to question everyone in the population.
6. (a) Convenience sampling, because all of the people sampled are in one convenient location.
   (b) Systematic sampling, because every fifth part is sampled.
   (c) Stratified sampling, because the population is first stratified and then a sample is collected from each stratum.
7. Convenience
8. (a) False. A statistic is a numerical measure that describes a sample characteristic.
   (b) False. Ratio data represent the highest level of measurement.