MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the data set is a population or a sample.

    1. The age of every fourth person entering a department store

        A. sample   B. population

      Answer: A

    2. The age of each employee at a local grocery store

        A. sample   B. population

      Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Identify the population and the sample.

    3. A survey of 1,947 American households found that 53% of the households own a computer.

      Answer: population: collection of all American households; sample: collection of 1,947 American households surveyed

    4. When 1,564 American households were surveyed, it was found that 56% of them owned two cars.

      Answer: population: collection of all American households; sample: collection of 1,564 American households surveyed

    5. A survey of 2625 elementary school children found that 28% of the children could be classified as obese.

      Answer: population: elementary school children; sample: collection of 2625 elementary school children surveyed.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the Venn diagram to identify the population and the sample.

    6.
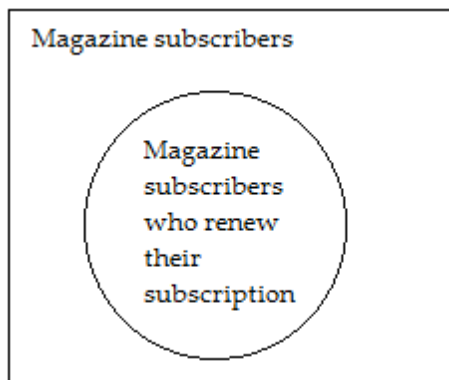
        A. Population: Magazine subscribers; Sample; Magazine subscribers who renew their subscription
        B. Population: Magazine subscribers who renew their subscription; Sample: Magazine subscribers

      Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Determine whether the numerical value is a parameter or a statistic. Explain your reasoning.

    7. A recent survey by the alumni of a major university indicated that the average salary of 12,000 of its 175,000 graduates was $95,000.

      Answer: It describes a statistic because the number $95,000 is based on a subset of the population.

8. The average salary of all assembly–line employees at a certain car manufacturer is $42,000.

   Answer: It describes a parameter because the $42,000 is based on all the workers at the car manufacturer.

9. A survey of 1,678 students was taken from a university with 16,500 students.

   Answer: It describes a statistic because the number 1,678 is based on a subset of the population.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Identify whether the statement describes inferential statistics or descriptive statistics.

10. The average age of the students in a statistics class is 19 years.
    - A. inferential statistics
    - B. descriptive statistics

    Answer: B

11. The chances of winning the California Lottery are one chance in twenty–two million.
    - A. inferential statistics
    - B. descriptive statistics

    Answer: A

12. There is a relationship between smoking cigarettes and getting emphysema.
    - A. descriptive statistics
    - B. inferential statistics

    Answer: B

13. From past figures, it is predicted that 47% of the registered voters in California will vote in the June primary.
    - A. inferential statistics
    - B. descriptive statistics

    Answer: A

14. Based on previous clients, a marriage counselor concludes that the majority of marriages that begin with cohabitation before marriage will result in divorce.
    - A. inferential statistics
    - B. descriptive statistics

    Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

15. Explain the difference between a sample and a population.

    Answer: A population is the collection of *all* outcomes, responses, measurements, or counts that are of interest..
    A sample is a subset of a population.

16. If you had to do a statistical study, would you use a sample or a population? Why?

    Answer: A sample would be used. It is usually impractical to obtain all the population data.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the data are qualitative or quantitative.

17. the colors of automobiles on a used car lot
    - A. qualitative
    - B. quantitative

    Answer: A

18. the number of complaint letters received by the United States Postal Service in a given day
    - A. quantitative
    - B. qualitative

    Answer: A

19. the number of seats in a movie theater
    A. qualitative   B. quantitative
    Answer: B

20. the numbers on the shirts of a girl's soccer team
    A. qualitative   B. quantitative
    Answer: A

Identify the data set's level of measurement.

21. hair color of women on a high school tennis team
    A. ratio   B. ordinal   C. interval   D. nominal
    Answer: D

22. numbers on the shirts of a girl's soccer team
    A. interval   B. nominal   C. ordinal   D. ratio
    Answer: B

23. ages of students in a statistic class
    A. nominal   B. ordinal   C. interval   D. ratio
    Answer: D

24. temperatures of 20 selected refrigerators
    A. nominal   B. interval   C. ordinal   D. ratio
    Answer: B

25. number of milligrams of tar in 96 cigarettes
    A. nominal   B. interval   C. ratio   D. ordinal
    Answer: C

26. number of pages in your statistics book
    A. interval   B. ratio   C. nominal   D. ordinal
    Answer: B

27. marriage status (married, single, or divorced) of the faculty at the University of Colorado
    A. ordinal   B. interval   C. nominal   D. ratio
    Answer: C

28. list of 1,252 social security numbers
    A. interval   B. ordinal   C. nominal   D. ratio
    Answer: C

29. the ratings of a movie ranging from "poor" to "good" to "excellent"
    A. nominal   B. ratio   C. ordinal   D. interval
    Answer: C

30. the final grades (A, B, C, D, and F) for students in a statistics class
    A. ordinal   B. interval   C. nominal   D. ratio
    Answer: A

31. the annual salaries for all teachers in California
    A. ratio   B. ordinal   C. nominal   D. interval
    Answer: A

32. list of zip codes for Chicago
    A. nominal   B. ratio   C. interval   D. ordinal
    Answer: A

33. the nationalities listed in a recent survey (for example, Asian, European, or Hispanic).
    A. ordinal   B. nominal   C. ratio   D. interval
    Answer: B

34. the amounts of fat (in grams) in 94 cookies
    A. ordinal   B. ratio   C. interval   D. nominal
    Answer: B

35. the years the summer Olympics were held in the United States
    A. interval   B. nominal   C. ordinal   D. ratio
    Answer: A

36. numbers of touchdowns scored by a major university in five randomly selected games

    4   3   3   1   1
    A. nominal   B. ratio   C. ordinal   D. interval
    Answer: B

37. the average daily temperatures (in degrees Fahrenheit) on five randomly selected days

    31 27 28 37 38
    A. nominal   B. ordinal   C. ratio   D. interval
    Answer: D

38. manuscripts rated "acceptable" or "unacceptable"
    A. ordinal   B. interval   C. nominal   D. ratio
    Answer: A

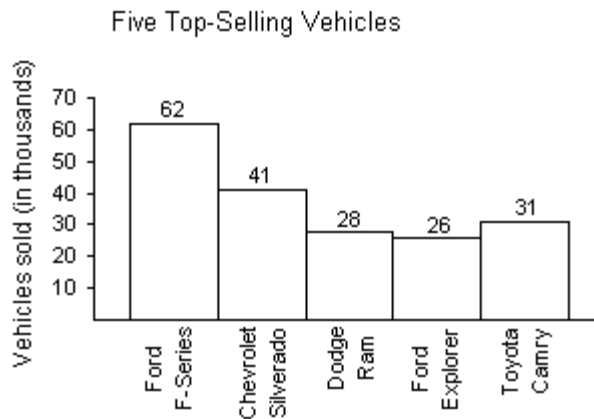39. the lengths (in minutes) of the top ten movies with respect to ticket sales in 2007
    A. ratio   B. ordinal   C. nominal   D. interval
    Answer: A

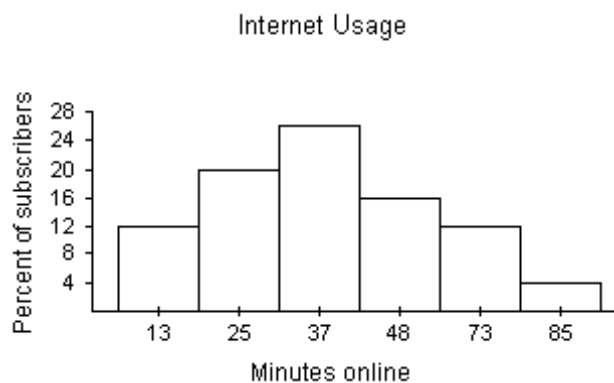40. the data listed on the horizontal axis in the graph

Five Top-Selling Vehicles

    A. nominal   B. interval   C. ratio   D. ordinal

Answer: A

41. the data listed on the horizontal axis in the graph

Internet Usage

    A. ordinal   B. interval   C. ratio   D. nominal

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

42. Explain the differences between the interval and ratio levels of measurement.

Answer: Data at the ratio level are similar to data at the interval level, but with the added property that a zero entry is an inherent zero (implies "none"). Also, for data at the ratio level a ratio of two data values can be formed so that one data value can be expressed as a multiple of another.

43. Explain why data expressed with the Celsius temperature scale is at the interval level of measurement rather than the ratio level.

Answer: Such data is at the interval level rather than the ratio level because the temperature of 0°C does not represent a condition where no heat is present, so it is not an inherent zero as required by the ratio level. Also, ratios of two temperatures cannot be formed so that one data value is expressed as a multiple of the other. The temperature 2°C is not twice as warm as 1°C.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the study is an observational study or an experiment.

44. A medical researcher obtains a sample of adults suffering from diabetes. She randomly assigns 87 people to a treatment group and 87 to a placebo group. The treatment group receives a medication over a period of three months and the placebo group receives a placebo over the same time frame. At the end of three months the patients' symptoms are evaluated.

    A. experiment
    B. observational study

    Answer: A

45. A poll is conducted in which professional musicians are asked their ages.

    A. observational study
    B. experiment

    Answer: A

46. A pollster obtains a sample of students and asks them how they will vote on an upcoming referendum.

    A. observational study
    B. experiment

    Answer: A

47. The personnel director at a large company would like to determine whether the company cafeteria is widely used by employees. She calls each employee and asks them whether they usually bring their own lunch, eat at the company cafeteria, or go out for lunch.

    A. experiment
    B. observational study

    Answer: B

48. A scientist was studying the effects of a new fertilizer on crop yield. She randomly assigned half of the plots on a farm to group one and the remaining plots to group two. On the plots in group one, the new fertilizer was used for a year. On the plots in group two, the old fertilizer was used. At the end of the year the average crop yield for the plots in group one was compared with the average crop yield for the plots in group two.

    A. experiment
    B. observational study

    Answer: A

49. A researcher obtained a random sample of 100 smokers and a random sample of 100 nonsmokers. After interviewing all 200 participants in the study, the researcher compared the rate of depression among the smokers with the rate of depression among nonsmokers.

    A. observational study
    B. experiment

    Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Identify the experimental units and treatments used in the experiment.

50. A medical researcher center wants to test the effectiveness of a new diabetes medication. The company identifies 10 adults suffering from a similar form of diabetes. The subjects are randomly assigned to two groups. One group is given a medication and the other is given a placebo that looks exactly like the medication. After three months, the subjects' symptoms are studied and compared.

    Answer: The experimental units are the 10 adults in the study. The treatment is the new diabetes medication.

Provide an appropriate response.

51. Explain what bias there is in a study done entirely online.

    Answer: The study may be biased because it is limited to people with computers.

52. A report sponsored by the California Citrus Commission stated that cholesterol levels can be lowered by drinking at least one glass of a citrus product each day. Determine if the report is biased.

    Answer: A report sponsored by the citrus industry is much more likely to reach conclusions favorable to the industry.

53. A local newspaper ran a survey by asking, "Do you support the deployment of a weapon that could kill millions of innocent people?" Determine whether the survey question is biased.

    Answer: The wording of the question is biased, as it tends to encourage negative responses.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Identify the sampling technique used.

54. Thirty–five sophomores, 59 juniors and 63 seniors are randomly selected from 572 sophomores, 258 juniors and 221 seniors at a certain high school.
    A. systematic
    B. cluster
    C. convenience
    D. random
    E. stratified

    Answer: E

55. Every fifth person boarding a plane is searched thoroughly.
    A. convenience
    B. random
    C. systematic
    D. cluster
    E. stratified

    Answer: C

56. At a local community college, five statistics classes are randomly selected out of 20 and all of the students from each class are interviewed.
    A. random
    B. systematic
    C. cluster
    D. stratified
    E. convenience

    Answer: C

57. A researcher randomly selects and interviews fifty male and fifty female teachers.
    A. cluster
    B. convenience
    C. random
    D. stratified
    E. systematic

    Answer: D

58. A researcher for an airline interviews all of the passengers on five randomly selected flights.
    A. systematic
    B. cluster
    C. stratified
    D. random
    E. convenience

    Answer: B

59. A community college student interviews everyone in a particular statistics class to determine the percentage of students that own a car.
    A. random
    B. stratified
    C. systematic
    D. cluster
    E. convenience

    Answer: E

60. Based on 12,000 responses from 47,000 questionnaires sent to its alumni, a major university estimated that the annual salary of its alumni was $98,000 per year.
    A. stratified
    B. cluster
    C. random
    D. convenience
    E. systematic

    Answer: C

61. In a recent television survey, participants were asked to answer "yes" or "no" to the question "Are you in favor of the death penalty?" Six thousand five hundred responded "yes" while 5900 responded "no". There was a fifty–cent charge for the call.
    A. stratified
    B. convenience
    C. random
    D. cluster
    E. systematic

    Answer: B

62. A lobbyist for a major airspace firm assigns a number to each legislator and then uses a computer to randomly generate ten numbers. The lobbyist contacts the legislators corresponding to these numbers.
    A. systematic
    B. convenience
    C. cluster
    D. stratified
    E. random

    Answer: E

63. To ensure customer satisfaction, every 35th phone call received by customer service will be monitored.
    A. convenience
    B. cluster
    C. stratified
    D. random
    E. systematic

   Answer: E

64. A market researcher randomly selects 100 drivers under 20 years of age and 500 drivers over 20 years of age.
    A. cluster
    B. systematic
    C. random
    D. stratified
    E. convenience

   Answer: D

65. To avoid working late, the quality control manager inspects the last 60 items produced that day.
    A. stratified
    B. systematic
    C. convenience
    D. random
    E. cluster

   Answer: C

66. The names of 40 contestants are written on 40 cards. The cards are placed in a bag, and three names are picked from the bag.
    A. random
    B. convenience
    C. cluster
    D. systematic
    E. stratified

   Answer: A

67. A researcher randomly selected 20 of the nation's middle schools and interviewed all of the teachers at each school.
    A. random
    B. stratified
    C. systematic
    D. convenience
    E. cluster

   Answer: E

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

68. After a hurricane, a disaster area is divided into 200 equal grids. Thirty of the grids are selected and every occupied household in the grid is interviewed to help focus relief efforts. Select the numbers of the first five grids that belong to the cluster sample.

    16348   76938   90169   51392   55887   71015   09209   79157

    Answer: 163, 169, 15, 92, 97

69. There are 750 incoming freshmen attending a university this fall. A researcher wishes to send questionnaires to a sample of 30 of them to complete regarding their drinking habits. Select the numbers of the first five freshmen who belong to the simple random sample.

    16348   76938   90169   51392   55887   71015   09209   79157

    Answer: 163, 487, 693, 169, 513

70. A college employs 85 faculty members. Without replacement, select the numbers of the five members who will serve on the tenure committee next year.

    16348   76938   90169   51392   55887   71015   09209   79157

    Answer: 16, 34, 69, 38, 13

71. Of the 5000 outpatients released from a local hospital in the past year, one hundred were contacted and asked their opinion on the care they received. Select the first five patients who belong to the simple random sample.

    16348   76938   90169   51392   55887   71015   09209   79157

    Answer: 1634, 3890, 1695, 1392, 1509

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether you would take a census or use a sampling. If you would use a sampling, decide what sampling technique you would use.

72. The average age of the 80 residents of an assisted living center.
    A. stratified sampling   B. cluster sampling
    C. random sampling   D. census

    Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

73. Explain the differences between cluster sampling and stratified sampling.

    Answer: In stratified sampling, members of the population are divided into two or more subsets, or strata, that share a similar characteristic. A sample is then randomly selected from each of the strata. A stratified sample has members from each segment of the population. In cluster sampling, the population is divided into naturally occurring subgroups, each having similar characteristics. All of the members in one or more (but not all) of the clusters are then selected. In a cluster sample, care must be taken to ensure that all clusters have similar characteristics.

74. Explain the difference between a census and a sampling and describe the advantages and disadvantages of each.

    Answer: A census is a count or measure of an entire population, while a sampling is a count or measure of part of a population. A census provides complete information but is often expensive, difficult, and time consuming to perform especially if the population is large. A sampling is less expensive and time consuming, however appropriate sampling techniques must be used to ensure that unbiased data are collected and that the sample is representative of the population. Even with the best sampling methods, sampling error can occur.