

S.IC.B.3: Analysis of Data 1

- 1 Which statement about statistical analysis is *false*?
 - 1) Experiments can suggest patterns and relationships in data.
 - 2) Experiments can determine cause and effect relationships.
 - 3) Observational studies can determine cause and effect relationships.
 - 4) Observational studies can suggest patterns and relationships in data.
- 2 Which investigation technique is most often used to determine if a single variable has an impact on a given population?
 - 1) observational study
 - 2) random survey
 - 3) controlled experiment
 - 4) formal interview
- 3 A researcher randomly divides 50 bean plants into two groups. He puts one group by a window to receive natural light and the second group under artificial light. He records the growth of the plants weekly. Which data collection method is described in this situation?
 - 1) observational study
 - 2) controlled experiment
 - 3) survey
 - 4) systematic sample
- 4 A sociologist reviews randomly selected surveillance videos from a public park over a period of several years and records the amount of time people spent on a smartphone. The statistical procedure the sociologist used is called
 - 1) a census
 - 2) an experiment
 - 3) an observational study
 - 4) a sample survey
- 5 A veterinary pharmaceutical company plans to test a new drug to treat a common intestinal infection among puppies. The puppies are randomly assigned to two equal groups. Half of the puppies will receive the drug, and the other half will receive a placebo. The veterinarians monitor the puppies. This is an example of which study method?
 - 1) census
 - 2) observational study
 - 3) survey
 - 4) controlled experiment
- 6 A researcher wants to determine if room-darkening shades cause people to sleep longer. Which method of data collection is most appropriate?
 - 1) census
 - 2) survey
 - 3) observation study
 - 4) controlled experiment
- 7 A cafeteria food manager studied the lunchtime eating habits of a group of employees in their office building. The purpose of the study was to determine the proportion of employees who purchased lunch in the cafeteria, brought their lunch from home, or purchased lunch from an outside vendor. This collection of data would best be classified as
 - 1) a census
 - 2) an experiment
 - 3) an observational study
 - 4) a simulation
- 8 In watching auditions for lead singer in a band, Liem became curious as to whether there is an association between how animated the lead singer is and the amount of applause from the audience. He decided to watch each singer and rate the singer on a scale of 1 to 5, where 1 is the least animated and 5 is the most animated. He did this for all 5 nights of auditions and found that the more animated singers did receive louder applause. The study Liem conducted would be best described as
 - 1) experimental
 - 2) observational
 - 3) a sample survey
 - 4) a random assignment

- 9 Which scenario is best described as an observational study?
- 1) For a class project, students in Health class ask every tenth student entering the school if they eat breakfast in the morning.
 - 2) A social researcher wants to learn whether or not there is a link between attendance and grades. She gathers data from 15 school districts.
 - 3) A researcher wants to learn whether or not there is a link between children's daily amount of physical activity and their overall energy level. During lunch at the local high school, she distributed a short questionnaire to students in the cafeteria.
 - 4) Sixty seniors taking a course in Advanced Algebra Concepts are randomly divided into two classes. One class uses a graphing calculator all the time, and the other class never uses graphing calculators. A guidance counselor wants to determine whether there is a link between graphing calculator use and students' final exam grades.
- 10 According to a study, 45% of Americans have type O blood. If a random number generator produces three-digit values from 000 to 999, which values would represent those having type O blood?
- 1) between 000 and 045, inclusive
 - 2) between 000 and 444, inclusive
 - 3) between 000 and 449, inclusive
 - 4) between 000 and 450, inclusive
- 11 Describe how a controlled experiment can be created to examine the effect of ingredient X in a toothpaste.
- 12 A group of high school students wanted to collect information on how many times per week students exercised. If they want the *least* biased results they should survey every fifth student at the school who is
- 1) entering the gym
 - 2) in the junior class
 - 3) entering the library
 - 4) entering the building
- 13 A random sample of 100 people that would best estimate the proportion of all registered voters in a district who support improvements to the high school football field should be drawn from registered voters in the district at a
- 1) football game
 - 2) supermarket
 - 3) school fund-raiser
 - 4) high school band concert
- 14 Cheap and Fast gas station is conducting a consumer satisfaction survey. Which method of collecting data would most likely lead to a biased sample?
- 1) interviewing every 5th customer to come into the station
 - 2) interviewing customers chosen at random by a computer at the checkout
 - 3) interviewing customers who call an 800 number posted on the customers' receipts
 - 4) interviewing every customer who comes into the station on a day of the week chosen at random out of a hat
- 15 The operator of the local mall wants to find out how many of the mall's employees make purchases in the food court when they are working. She hopes to use these data to increase the rent and attract new food vendors. In total, there are 1023 employees who work at the mall. The best method to obtain a random sample of the employees would be to survey
- 1) all 170 employees at each of the larger stores
 - 2) 50% of the 90 employees of the food court
 - 3) every employee
 - 4) every 30th employee entering each mall entrance for one week

- 16 Mrs. Favata's statistics class wants to conduct a survey to see how students feel about changing the school mascot's name. Which plan is the best process for gathering an appropriate sample?
- 1) Survey students in a random sample of senior homerooms.
 - 2) Survey every tenth student entering art classes in the school.
 - 3) Survey every fourth student entering the cafeteria during each lunch period.
 - 4) Survey all members of the school's varsity sports teams.
- 17 Which statement(s) about statistical studies is true?
- I. A survey of all English classes in a high school would be a good sample to determine the number of hours students throughout the school spend studying.
 - II. A survey of all ninth graders in a high school would be a good sample to determine the number of student parking spaces needed at that high school.
 - III. A survey of all students in one lunch period in a high school would be a good sample to determine the number of hours adults spend on social media websites.
 - IV. A survey of all Calculus students in a high school would be a good sample to determine the number of students throughout the school who don't like math.
- 1) I, only
 - 2) II, only
 - 3) I and III
 - 4) III and IV
- 18 Which statement about data collection is most accurate?
- 1) A survey about parenting styles given to every tenth student entering the library will provide unbiased results.
 - 2) An observational study allows a researcher to determine the cause of an outcome.
 - 3) Margin of error increases as sample size increases.
 - 4) A survey collected from a random sample of students in a school can be used to represent the opinions of the school population.

- 19 Chuck's Trucking Company has decided to initiate an Employee of the Month program. To determine the recipient, they put the following sign on the back of each truck.



The driver who receives the highest number of positive comments will win the recognition. Explain *one* statistical bias in this data collection method.

- 20 The business office of a local college wishes to determine the methods of payment that will be used by students when buying books at the beginning of a semester. Explain how the office can gather an appropriate sample that minimizes bias.

S.IC.B.3: Analysis of Data 1

Answer Section

- 1 ANS: 3 REF: 011706aii
 2 ANS: 3 REF: 012015aii
 3 ANS: 2 REF: 081802aii
 4 ANS: 3 REF: 061901aii
 5 ANS: 4 REF: 081906aii
 6 ANS: 4 REF: 062216aii
 7 ANS: 3 REF: 012401aii
 8 ANS: 2 REF: 082204aii
 9 ANS: 2 REF: 081717aii
 10 ANS: 3

between 000 and 449, inclusive $\rightarrow \frac{450}{1000} = 45\%$

REF: 012024aii

- 11 ANS:
 Randomly assign participants to two groups. One group uses the toothpaste with ingredient X and the other group uses the toothpaste without ingredient X .

REF: 061626aii

- 12 ANS: 4 REF: 082301aii
 13 ANS: 2 REF: 011910aii
 14 ANS: 3
 Self selection causes bias.

REF: 061703aii

- 15 ANS: 4 REF: 011801aii
 16 ANS: 3
 To determine student opinion, survey the widest range of students.

REF: 062202aii

- 17 ANS: 1
 II. Ninth graders drive to school less often; III. Students know little about adults; IV. Calculus students love math!

REF: 081602aii

- 18 ANS: 4 REF: 012314aii
 19 ANS:
 Self selection is a cause of bias because people with more free time are more likely to respond.

REF: 061828aii

- 20 ANS:
 Pick random names from a list of all students and ask each one his method.

REF: 062325aii