Unit 3 Progress Check: MCQ Part A

1. Kristen is investigating the opinions of students at her high school on the new school hours proposed by the school board. Which of the following is her population of interest?

(A) All members of the school board

(B) All teachers at her school

(C) All students at her high school ✓

(D) All students in the school district

(E) All high school students in the state

Answer C

Correct. Kristen is investigating the opinions of the students at her high school, so her population of interest is all the students at her high school.

2. A sample of students will be selected from all the students at a high school. Which of the following sampling methods is least likely to produce a representative sample of the students?

(A) From a list of all student names, randomly select 50 names from the list for the sample.

(B) Randomly choose five classrooms in the school and use all the students in those classrooms for the sample.

(C) Divide the students into the four class years (freshman, sophomore, junior, senior) and randomly select students from each year in proportion to the number of students in each year.

(D) From a numbered list of all student names, randomly choose a starting point and then choose every tenth student on the list.

(E) From a randomly chosen home basketball game, choose every tenth student who enters the gymnasium. ✓

Answer E

Correct. Such a method will probably overrepresent fans of basketball and underrepresent other subgroups of students.

3. A teacher at a culinary arts school will conduct an experiment to investigate which of three methods of instruction works best in teaching students how to make a good pie crust. Each student in a group of 60 students will be randomly assigned to one of three methods: in-person demonstration by the instructor, watching a video, and reading a recipe. The students will be assigned so that each method will have 20 students. Each pie crust made will be judged on its taste and texture. What are the treatments of the experiment?

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(A) The 60 students

(B) The three methods of instruction ✓

(C) The 20 students within each group

(D) The scores on taste and texture

(E) The 60 pie crusts made

Answer B

Correct. Treatments are the experimental conditions to be compared in the experiment and are applied to subjects, so the treatments are the three methods of instruction that are applied to the 60 students.

4. The manager of a shopping mall distributed a customer-satisfaction survey by handing it to people as they came through one of the doors to the mall one day. Of those handed out, 215 were completed and returned. Should the results of the survey be generalized to the population of all customers of the shopping mall?

(A) Yes, because the sample size is large.

(B) Yes, because only people entering the mall were given the survey.

(C) Yes, because the sample was representative.

(D) No, because a random sample from all customers of the shopping mall was not selected. ✓

(E) No, because not all customers were selected.

Answer D

Correct. It is only appropriate to make generalizations about a population based on samples that are randomly selected from the population. The sample described here is not a random sample, so the results should not be generalized to the population of all customers of the mall.

5. Which of the following is a benefit to using a random sample for an observational study?

(A) The random sample allows for different treatments to be assigned.

(B) A causal relationship can be determined.

(C) The results of the observational study can be generalized to the population. ✓

(D) A random sample is the easiest method of data collection.

(E) The distribution of the sample will match the distribution of the population.

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Answer C

Correct. Random samples are usually representative of the population and results can be generalized.

6. Matt wants to investigate the opinions of young adults in the country, ages 18 years to 25 years, about time spent playing video games. He plans to administer a survey to a sample of people. Which of the following samples is most likely to generalize to his population of interest?

(A) A nationwide sample of people ages 18 to 25 ✓

(B) A sample of attendees of a gaming convention

(C) A sample of people ages 18 to 25 in Matt's hometown

(D) A sample of people who click on a link in an online gaming site

(E) A sample of people who buy video games from an online store

Answer A

Correct. Such a sample will be most representative of all people in the country in the targeted age-group.

7. The president of a small company needs to collect data on the educational background of all 20 of the company's employees. Which of the following is the best method to use for data collection?

(A) A census ✓

(B) A cluster sample

(C) A simple random sample

(D) A stratified sample

(E) A systematic random sample

Answer A

Correct. Because information is needed on the population of all employees, a census should be taken.

8. To estimate the size of a typical housing unit in a certain town, a sociologist plans to use a cluster sampling method to gather data. Which of the following describes a cluster sampling method?

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(A) Randomly select a certain number of housing units in the town.

(B) Divide all housing units into three groups: small, medium, and large. Then randomly select a certain number from each group.

(C) Divide the town into nonoverlapping regions. Randomly select from the nonoverlapping regions, and select all housing units in those regions. ✓

(D) Obtain a listing of all housing units currently for sale in the town, and use the size information given in the listing.

(E) Obtain the records kept by the town of all housing units in the town, and use the information in those records.

Answer C

Correct. Cluster sampling involves dividing the town into nonoverlapping regions, selecting some of the regions at random, and then recording the sizes of the housing units in each of the selected clusters. The nonoverlapping geographic regions are the clusters.

9. A certain store has 3,000 employees working at its main location in a city and 100 employees working at a smaller location outside the city. The store manager will select a sample of 50 employees from all the employees to ask their opinions about extending store hours during the holidays. What is the advantage of selecting a stratified random sample, with location as strata, instead of a simple random sample?

(A) The stratified sample assures the most random selection from among all selection methods.

(B) The stratified sample assures that the opinions of employees from both locations will be represented. ✓

(C) The stratified sample will be less expensive to implement than a simple random sample and will save money over time.

(D) The stratified sample assures employees that store hours will not be extended until their opinions are recorded.

(E) There is no real advantage to stratifying because a simple random sample is always the best.

Answer B

Correct. Other sampling methods could result in underrepresentation of the opinions of the 100 employees at the smaller location. The use of a stratified sample ensures that the opinions of the employees at both locations will be considered.

10. A certain company has five departments, A, B, C, D, and E. The number of employees in each department is 10, 10, 20, 30, and 30, respectively. A sample of 10 employees from all employees will be selected. Of the following descriptions of sampling procedures, which is most likely to introduce a potential source of bias?

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(A) Randomly select 10 employees from department C ✓

(B) Randomly select 10 employees from all 100 employees

(C) Randomly select 2 employees from each of the five departments

(D) Randomly select 1 employee from each of A and B, 2 employees from C, and 3 employees from each of D and E

(E) Randomly select every tenth employee from a randomized list of names of all employees

Answer A

Correct. If the sample consists of employees from department C only, then responses from the department C employees are systematically favored over responses from employees in other departments.

11. A scientist studying soil acidity collected soil samples from a plot of land with a stream running through it. The soil samples came from land located on only one side of the stream. What is the potential source of bias that might result from the sampling method?

(A) Voluntary response bias

(B) Undercoverage bias ✓

(C) Nonresponse bias

(D) Response Bias, where responses are self-reported

(E) Response Bias, where the question wording is leading or confusing

Answer B

Correct. A portion of land has been excluded from providing soil samples, so there is undercoverage of the land in the samples collected. The soil acidity in the sample collected by the scientist may not be representative of the soil acidity of the entire plot because of undercoverage bias.

12. A survey will be sent to dog owners to investigate their opinions on multiple topics. Which of the following questions on the survey is most likely to contribute to question-wording bias?

(A) How many dogs do you own?

(B) Should responsible dog owners purchase pet insurance? ✓

(C) How much money do you spend on dog food each year?

(D) How many times did you take your dogs to a vet last year?

(E) Does your dog sleep in your bed on a regular basis?

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Answer B

Correct. The judgmental question wording leads the reader to respond in a way that makes them seem responsible. If the reader were to answer no, they would be indicating that they are not responsible. Answering yes will verify that they are responsible. The question will encourage answers of yes, even though the response may not be true.