

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

Provide an appropriate response. Explain your answer.

- 1) List the nine different abuses of statistics and give examples for five of the nine. 1) _____

- 2) Define observational study and experiment. Define the terms "treatment group" and "placebo group" as part of your answer. 2) _____

- 3) Describe a double blind experiment and explain why blinding is used. Define the term "placebo effect" as part of the answer. 3) _____

- 4) Define random sample. Explain why this is important in design of experiments. 4) _____

- 5) Define sampling error and nonsampling error. Give examples of nonsampling error. 5) _____

- 6) A hip hop radio show broadcast in the city of Puddelton asked people to call in and express their opinions on the new mayor. Are the results likely to be representative of all adults in Puddelton? Of all listeners to the hip hop show? Why or why not? 6) _____

- 7) Would an observational study or an experiment be more appropriate to investigate the effects on humans of a substance known to be toxic? Explain. 7) _____

8) A student surveyed a simple random sample of students at her college. Is this sample likely to be representative of all students at her college? Of all adults in the United States? Explain. 8) _____

9) A lawyer surveyed a simple random sample of his colleagues and asked them whether they were left-handed or right-handed. Is this convenience sample likely to provide results typical of all adults in the United States? Do convenience samples in general provide good results? 9) _____

10) A teacher was interested in knowing how much tax people pay in the United States. She selected a simple random sample of her friends and asked them about their taxes. Is this sample likely to be representative of all adults in the United States? 10) _____

Use critical thinking to address the key issue.

11) You plan to make a survey of 200 people. The plan is to talk to every 10th person coming out of the school library. Is there a problem with your plan? 11) _____

12) A questionnaire is sent to 10,000 persons. 5,000 responded to the questionnaire. 3,000 of the respondents say that they "love chocolate ice cream". We conclude that 60% of people love chocolate ice cream. What is wrong with this survey? 12) _____

13) A researcher published this survey result: "74% of people would be willing to spend 10 percent more for energy from a non-polluting source". The survey question was announced on a national radio show and 1,200 listeners responded by calling in. What is wrong with this survey? 13) _____

14) "38% of adults in the United States regularly visit a doctor". This conclusion was reached by a college student after she had questioned 520 randomly selected members of her college. What is wrong with her survey? 14) _____

- 15) A researcher wished to gauge public opinion on gun control. He randomly selected 1000 people from among registered voters and asked them the following question: "Do you believe that gun control laws which restrict the ability of Americans to protect their families should be eliminated?". Identify the abuse of statistics and suggest a way the researcher's methods could be improved. 15) _____

Determine whether the given description corresponds to an observational study or an experiment. Explain.

- 16) A marketing firm does a survey to find out how many people use a product. Of the one hundred people contacted, fifteen said they use the product. 16) _____
- 17) A clinic gives a drug to a group of ten patients and a placebo to another group of ten patients to find out if the drug has an effect on the patients' illness. 17) _____
- 18) A sample of fish is taken from a lake to measure the effect of pollution from a nearby factory on the fish. 18) _____
- 19) A political pollster reports that his candidate has a 10% lead in the polls with 10% undecided. 19) _____
- 20) A quality control specialist compares the output from a machine with a new lubricant to the output of machines with the old lubricant. 20) _____
- 21) A stock analyst selects a stock from a group of twenty for investment by choosing the stock with the greatest earnings per share reported for the last quarter. 21) _____
- 22) A stock analyst compares the relationship between stock prices and earnings per share to help him select a stock for investment. 22) _____
- 23) A T.V. show's executives raised the fee for commercials following a report that the show received a "No. 1" rating in a survey of viewers. 23) _____
- 24) A T.V. show's executives commissioned a study to gauge the impact of the show's ratings on the sales of its advertisers. 24) _____

25) A doctor performs several diagnostic tests to determine the reason for a patient's illness. 25) _____

Solve the problem.

26) A report sponsored by the California Citrus Commission concluded that cholesterol levels can be lowered by drinking at least one glass of a citrus product each day. Explain why the report is likely to be biased. 26) _____

27) A local newspaper ran a survey by asking, "Do you support the deployment of a weapon that could kill millions of innocent people?" Explain why the survey question is biased and what type of bias is present. 27) _____

Provide an appropriate response.

28) An education expert is researching teaching methods and wishes to interview teachers from a particular school district. She randomly selects ten schools from the district and interviews all of the teachers at the selected schools. Does this sampling plan result in a random sample? Simple random sample? Explain. 28) _____

29) A psychology student wishes to investigate differences in political opinions between business majors and political science majors at her college. She randomly selects 100 students from the 260 business majors and 100 students from the 180 political science majors. Does this sampling plan result in a random sample? Simple random sample? Explain. 29) _____

30) A computer company employs 100 software engineers and 100 hardware engineers. The personnel manager randomly selects 20 of the software engineers and 20 of the hardware engineers and questions them about career opportunities within the company. Does this sampling plan result in a random sample? Simple random sample? Explain. 30) _____

31) The personnel manager at a company wants to investigate job satisfaction among the female employees. One evening after a meeting she talks to all 30 female employees who attended the meeting. Does this sampling plan result in a random sample? Simple random sample? Explain. 31) _____

- 32) A polling company obtains an alphabetical list of names of voters in a precinct. They select every 20th person from the list until a sample of 100 is obtained. They then call these 100 people. Does this sampling plan result in a random sample? Simple random sample? Explain. 32) _____
- 33) A researcher obtains an alphabetical list of the 2560 students at a college. She uses a random number generator to obtain 50 numbers between 1 and 2560. She chooses the 50 students corresponding to those numbers. Does this sampling plan result in a random sample? Simple random sample? Explain. 33) _____
- 34) An electronics store receives a shipment of eight boxes of calculators. Each box contains ten calculators. A quality control inspector chooses a box by putting eight identical slips of paper numbered 1 to 8 into a hat, mixing thoroughly and then picking a slip at random. He then chooses a calculator at random from the box selected using a similar method with ten slips of paper in a hat. He repeats the process until he obtains a sample of 5 calculators for quality control testing. Does this sampling plan result in a random sample? Simple random sample? Explain. 34) _____
- 35) A market researcher obtains a sample of 50 people by standing outside a store and asking every 20th person who enters the store to fill out a survey until she has 50 people. What sampling method is being used here? Will the resulting sample be a random sample? Will it be a simple random sample? Explain your thinking. 35) _____
- 36) A teacher at a school obtains a sample of students by selecting a random sample of 20 students from each grade. What kind of sampling is being used here? Will the resulting sample be a simple random sample of the population of students at the school? Explain your thinking. 36) _____
- 37) A researcher obtains a sample of high school teachers in his school district by randomly selecting 10 high schools and interviewing all the teachers at each of these 10 schools. What kind of sampling is being used here? Will the resulting sample be a simple random sample of the population of teachers in the school district? Explain your thinking. 37) _____

- 38) Explain what is meant by the term "confounding" and give an example of an experiment in which confounding is likely to be a problem. 38) _____
- 39) At a school there are two different math classes of the same age. The two classes have different teachers. The school principal is interested in gauging the effectiveness of two different teaching methods and asks each teacher to try one of the methods. At the end of the semester both classes are given the same test and the results are compared. In this experiment, what is the variable of interest? Give some examples of variables which could be confounding variables. 39) _____
- 40) Why do you think that cluster sampling is frequently used in practice. 40) _____
- 41) A researcher wants to obtain a sample of 100 school teachers from the 800 school teachers in a school district. Describe procedures for obtaining a sample of each type: random, systematic, convenience, stratified, cluster. 41) _____
- 42) A researcher conducts an experiment to determine whether acupuncture can help people to recover from back injuries. Participants are randomly assigned to a treatment group or a control group. Over a period of three weeks, those assigned to the treatment group receive acupuncture treatments. At the end of the three weeks, the improvement reported by those in the treatment group is compared with the improvement reported by those in the control group. In this experiment there is no blinding. What does this mean and why could this cause a problem? 42) _____
- 43) In a clinical trial for a new headache medication, participants are randomly assigned to a treatment group or a placebo group. They do not know whether they are receiving the medication or a placebo. However the doctors administering the medication and evaluating the results do know which participants are receiving the medication. This experiment is blind but not double blind. Explain what this means and why the absence of double blinding could cause a problem. 43) _____