

Name:

AP Statistics Chapter 4 Study Guide

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. Can pleasant aromas help a student learn better? Two researchers believed that the presence of a floral scent could improve a person's learning ability in certain situations. They had 22 people work through a pencil-and-paper maze six times, three times while wearing a floral-scented mask and three times wearing an unscented mask. The three trials for each mask closely followed one another. Testers measured the length of time it took subjects to complete each of the six trials. They reported that, on average, subjects wearing the floral-scented mask completed the maze more quickly than those wearing the unscented mask, although the difference was not statistically significant. This study is
- a convenience sample.
 - an observational study, not an experiment.
 - an experiment, but not a double-blind experiment.
 - a double-blind experiment.
 - a voluntary response sample.
2. A television station is interested in predicting whether voters in its viewing area are in favor of federal funding for abortions. It asks its viewers to phone in and indicate whether they support/are in favor of or are opposed to this. Of the 2241 viewers who phoned in, 1574 (70.24%) were opposed to federal funding for abortions.
- Referring to the information above, the viewers who phoned in are
- a voluntary response sample.
 - a convenience sample.
 - a probability sample.
 - a population.
 - a census
3. A marketing research firm wishes to determine if the adult men in Laramie, Wyoming, would be interested in a new upscale men's clothing store. From a list of all residential addresses in Laramie, the firm selects a simple random sample of 100 and mails a brief questionnaire to each. The population of interest is
- all adult men in Laramie, Wyoming.
 - all residential addresses in Laramie, Wyoming.
 - the members of the marketing firm that actually conducted the survey.
 - the 100 addresses to which the survey was mailed.
 - upscale men's clothing stores
4. In order to assess the opinion of students at the University of Minnesota on campus snow removal, a reporter for the student newspaper interviews the first 12 students he meets who are willing to express their opinion. In this case, the sample is
- all those students favoring prompt snow removal.
 - all students at universities receiving substantial snow.
 - the 12 students interviewed.
 - all students at the University of Minnesota.
 - reporters at the student newspaper
5. A researcher is interested in the cholesterol levels of adults in the city in which she lives. A free cholesterol screening program is set up in the downtown area during the lunch hour. Individuals can walk in and have their cholesterol levels determined for free. One hundred and seventy three people use the service, and their average cholesterol is 217.8. The sample obtained is an example of

- a. a simple random sample, since the experimenter did not know beforehand which individuals would come to the screening.
- b. a stratified sample of high and low cholesterol individuals.
- c. a sample probably containing bias and undercoverage.
- d. a multistage sample of varying cholesterol levels.
- e. a systematic random sample



6. You are testing a new medication for relief of depression. You are going to give the new medication to subjects suffering from depression and see if their symptoms have lessened after a month. You have eight subjects available. Half of the subjects are to be given the new medication and the other half a placebo. The names of the eight subjects are given below.

1. Blumenthal	5. House
2. Costello	6. Long
3. Duvall	7. Pavlicova
4. Fan	8. Tang

Using the list of random digits

81507 27102 56027 55892 33063 41842
81868 71035 09001 43367 49497

starting at the beginning of this list and using single-digit labels, you assign the first four subjects selected to receive the new medication, while the remainder receive the placebo. The subjects assigned to the placebo are

- a. Blumenthal, Costello, Duvall, and Fan.
- b. Blumenthal, House, Pavlicova, and Tang.
- c. House, Long, Pavlicova, and Tang.
- d. Costello, Duvall, Fan, and Long.
- e. Costello, House, Duvall and Long



7. A study of human development showed two types of movies to groups of children. Crackers were available in a bowl, and the investigators compared the number of crackers eaten by children watching the different kinds of movies. One kind of movie was shown at 8 AM (right after the children had breakfast) and another at 11 AM (right before the children had lunch). It was found that during the movie shown at 11 AM, more crackers were eaten than during the movie shown at 8 AM. The investigators concluded that the different types of movies had an effect on appetite.

The results cannot be trusted because

- a. the study was not double-blind. Neither the investigators nor the children should have been aware of which movie was being shown.
- b. the investigators were biased. They knew beforehand what they hoped the study would show.
- c. the investigators should have used several bowls, with crackers randomly placed in each.
- d. children do not eat crackers while watching movies
- e. the time the movie was shown is a confounding variable.



8. We say that the design of a study is biased if which of the following is true?

- a. A racial or sexual preference is suspected
- b. Random placebos have been used
- c. Certain outcomes are systematically favored
- d. The correlation is greater than 1 or less than -1
- e. None of the above.



9. Consider an experiment to investigate the effectiveness of different insecticides in controlling pests and their effects on subsequent yield. What is the best reason for randomly assigning treatment levels (spraying or not spraying) to the experimental units (farms)?

- a. Randomization makes the experiment easier to conduct since we can apply the insecticide in any pattern rather than in a systematic fashion.

- b. Randomization will tend to average out all other uncontrolled factors such as soil fertility so that they are not confounded with the treatment effects.
- c. Randomization makes the analysis easier since the data can be collected and entered into the computer in any order.
- d. Randomization is required by statistical consultants before they will help you analyze the experiment.
- e. Randomization implies that it is not necessary to be careful during the experiment, during data collection, and during data analysis.

10. A nutritionist wants to study the effect of storage time (6, 12, and 18 months) on the amount of vitamin C present in freeze dried fruit when stored for these lengths of time. Vitamin C is measured in milligrams per 100 milligrams of fruit. Six fruit packs were randomly assigned to each of the three storage times. The treatment, experimental unit, and response are respectively:
- a. A specific storage time, amount of vitamin C, a fruit pack
 - b. A fruit pack, amount of vitamin C, a specific storage time
 - c. Random assignment, a fruit pack, amount of vitamin C
 - d. A specific storage time, a fruit pack, amount of vitamin C
 - e. A specific storage time, the nutritionist, amount of vitamin C


Name:

Score: 0 / 10 points (0%)

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Identify the choice that best completes the statement or answers the question.

-  — 1. Can pleasant aromas help a student learn better? Two researchers believed that the presence of a floral scent could improve a person's learning ability in certain situations. They had 22 people work through a pencil-and-paper maze six times, three times while wearing a floral-scented mask and three times wearing an unscented mask. The three trials for each mask closely followed one another. Testers measured the length of time it took subjects to complete each of the six trials. They reported that, on average, subjects wearing the floral-scented mask completed the maze more quickly than those wearing the unscented mask, although the difference was not statistically significant. This study is
- a convenience sample.
 - an observational study, not an experiment.
 - an experiment, but not a double-blind experiment.
 - a double-blind experiment.
 - a voluntary response sample.

ANSWER: C

This is definitely an experiment because treatments were given. The participants obviously knew which treatment they had since the presence of the scented or non-scented masks cannot be hidden from them. So this is NOT a double-blind experiment.

POINTS: 0 / 1

-  — 2. A television station is interested in predicting whether voters in its viewing area are in favor of federal funding for abortions. It asks its viewers to phone in and indicate whether they support/are in favor of or are opposed to this. Of the 2241 viewers who phoned in, 1574 (70.24%) were opposed to federal funding for abortions.


Referring to the information above, the viewers who phoned in are

- a voluntary response sample.
- a convenience sample.
- a probability sample.
- a population.
- a census

ANSWER: A

A **voluntary response** sample is one that chooses to be in the sample from a general appeal, such as a phone-in poll. The callers here chose to make the call and voluntarily become a part of the sample.


POINTS: 0 / 1

-  — 3. A marketing research firm wishes to determine if the adult men in Laramie, Wyoming, would be interested in a new upscale men's clothing store. From a list of all residential addresses in Laramie, the firm selects a simple random sample of 100 and mails a brief questionnaire to each. The population of interest is
- all adult men in Laramie, Wyoming.
 - all residential addresses in Laramie, Wyoming.
 - the members of the marketing firm that actually conducted the survey.
 - the 100 addresses to which the survey was mailed.
 - upscale men's clothing stores

ANSWER: A

The population for a survey is the complete set of people that this survey wants information from. The first sentence in the question tells us who this group is: A marketing research firm wishes to determine if the **adult men in Laramie, Wyoming**, would be interested in a new upscale men's clothing store.


POINTS: 0 / 1

-  — 4. In order to assess the opinion of students at the University of Minnesota on campus snow removal, a reporter for the student newspaper interviews the first 12 students he meets who are willing to express their opinion. In this case, the sample is
- all those students favoring prompt snow removal.
 - all students at universities receiving substantial snow.
 - the 12 students interviewed.
 - all students at the University of Minnesota.
 - reporters at the student newspaper

ANSWER: C

The sample for a survey is the group of people who were actually contacted and provided responses. Here that is the 12 students.


POINTS: 0 / 1

-  — 5. A researcher is interested in the cholesterol levels of adults in the city in which she lives. A free cholesterol screening program is set up in the downtown area during the lunch hour. Individuals can walk in and have their cholesterol levels determined for free. One hundred and seventy three people use the service, and their average cholesterol is 217.8. The sample obtained is an example of
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 - a stratified sample of high and low cholesterol individuals.
 - a sample probably containing bias and undercoverage.
 - a multistage sample of varying cholesterol levels.
 - a systematic random sample

ANSWER: C

This is a self-selected, voluntary response sample. Such samples are typically extreme and biased in some way. The people chose to be a part of the sample and are likely to be concerned about high cholesterol. As such, they will probably have higher cholesterol levels than the general population.

POINTS: 0 / 1

-  — 6. You are testing a new medication for relief of depression. You are going to give the new medication to subjects suffering from depression and see if their symptoms have lessened after a month. You have eight subjects available. Half of the subjects are to be given the new medication and the other half a placebo. The names of the eight subjects are given below.

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- b. Blumenthal, House, Pavlicova, and Tang.
- c. House, Long, Pavlicova, and Tang.
- d. Costello, Duvall, Fan, and Long.
- e. Costello, House, Duvall and Long

ANSWER: D

The first 5 numbers are 81507. The first four are selected to receive the new medication. They are: 8-Tang, 1-Blumenthal, 5-House and 7-Pavlicova (the 0 is ignored). That leaves the other 4 subjects for the placebo: Costello, Duvall, Fan, and Long.

POINTS: 0 / 1

-  7. A study of human development showed two types of movies to groups of children. Crackers were available in a bowl, and the investigators compared the number of crackers eaten by children watching the different kinds of movies. One kind of movie was shown at 8 AM (right after the children had breakfast) and another at 11 AM (right before the children had lunch). It was found that during the movie shown at 11 AM, more crackers were eaten than during the movie shown at 8 AM. The investigators concluded that the different types of movies had an effect on appetite.


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- b. the investigators were biased. They knew beforehand what they hoped the study would show.
- c. the investigators should have used several bowls, with crackers randomly placed in each.
- d. children do not eat crackers while watching movies
- e. the time the movie was shown is a confounding variable.

ANSWER: E

Since the time of the movie is different for the two groups, that could bias the results. Specifically, the 11 AM group will probably be hungrier since it is getting close to lunch. That means they will probably eat more, confounding the results of the experiment.


POINTS: 0 / 1

-  8. We say that the design of a study is biased if which of the following is true?
- a. A racial or sexual preference is suspected
 - b. Random placebos have been used
 - c. Certain outcomes are systematically favored
 - d. The correlation is greater than 1 or less than -1
 - e. None of the above.

ANSWER: C

This is the definition of bias - systematically favoring certain outcomes (whether intentional or unintentional).

POINTS: 0 / 1


-  9. Consider an experiment to investigate the effectiveness of different insecticides in controlling pests and their effects on subsequent yield. What is the best reason for randomly assigning treatment levels (spraying or not spraying) to the experimental units (farms)?
- a. Randomization makes the experiment easier to conduct since we can apply the insecticide in any pattern rather than in a systematic fashion.
 - b. Randomization will tend to average out all other uncontrolled factors such as soil fertility so that they are not confounded with the treatment effects.
 - c. Randomization makes the analysis easier since the data can be collected and entered into the computer in any order.

- d. Randomization is required by statistical consultants before they will help you analyze the experiment.
- e. Randomization implies that it is not necessary to be careful during the experiment, during data collection, and during data analysis.

ANSWER: B

The role of randomization in any experiment is to assign treatments to the subjects (or experimental units). This eliminates bias on the part of the experimenters. It also increases our chance of negating the effects of any lurking variables related to differences in individuals.

POINTS: 0 / 1

-  10. A nutritionist wants to study the effect of storage time (6, 12, and 18 months) on the amount of vitamin C present in freeze dried fruit when stored for these lengths of time. Vitamin C is measured in milligrams per 100 milligrams of fruit. Six fruit packs were randomly assigned to each of the three storage times. The treatment, experimental unit, and response are respectively:
- a. A specific storage time, amount of vitamin C, a fruit pack
 - b. A fruit pack, amount of vitamin C, a specific storage time
 - c. Random assignment, a fruit pack, amount of vitamin C
 - d. A specific storage time, a fruit pack, amount of vitamin C
 - e. A specific storage time, the nutritionist, amount of vitamin C

ANSWER: D

Treatment is what is done to the experimental units (storage times)

Experimental units are what are being experimented on (fruit packs)

Response variable is what is measured from experiment (amount of vitamin C)

POINTS: 0 / 1