

AP Stats
Chapter 4 Review**Multiple Choice**

- Data was collected in 20 cities on the percentage of women in the workforce. Data was collected in 1990 and 1994. Gains, or losses, in this percentage were the measurement upon which the study's conclusions were to be based. What kind of design is this?
 - A matched pairs design
 - An observational study
 - An experiment using a block design.(a) I only (b) II only (c) III only (d) I and III only (e) I and II only
- You want to do a survey of members of the senior class at your school and want to select a *simple random sample*. You intend to include 40 students in your sample. Which of the following approaches will generate a simple random sample?
 - Write the name of each student in the senior class on a slip of paper and put the papers in a container. Then randomly select 40 slips of paper from the container.
 - Assuming that the students are randomly assigned to classes, select two classes at random and include those students in your sample.
 - From a list of all seniors select one of the first 10 names at random. Then select every *n*th name on the list until you have 40 people selected.
 - Select the first 40 seniors to through the cafeteria door at lunch.
 - Randomly select 10 students from each of the four senior calculus classes.
- Which of the following is (are) the most important in designing an experiment? I. Control of all variables that might have an influence on the response variable. II. Randomization of subjects to treatment groups. III. Use of a larger number of subjects to control for small-sample variability.
 - I only
 - I and II only
 - II and III only
 - I, II, and III
 - II only
- Your company has developed a new treatment for acne. You think men and women might react differently to the medication, so you separate them into two groups. Then the men are randomly assigned to two groups and the women are randomly assigned to two groups. One of the two groups is given the medication and the other is given a placebo. The basic design of this study is
 - completely randomized
 - blocked by gender
 - completely randomized, blocked by gender
 - randomized, blocked by gender and type of medication
 - a matched pairs design
- A *double-blind* design is important in an experiment because
 - there is a natural tendency for subjects in an experiment to want to please the researcher
 - It helps control for the placebo effect
 - Evaluators of the responses in a study can influence the outcomes if they know which subjects are in the treatment group and which are in the control group
 - Subjects in a study might react differently if they knew they were receiving an active treatment or a placebo
 - All of the above are reasons why an experiment should be *double-blind*
- Which of the following is not an example of a probability sample?
 - You are going to sample 10% of a group of students. You randomly select one of the first 10 students on an alphabetical list and then select every 10th student after that on the list.
 - You are a sports-talk radio host interested in opinions about whether or not Pete Rose should be elected into the Baseball Hall of Fame, even though he has admitted to betting on his own teams. You ask listeners to call in and vote.
 - A random sample of drivers is selected to receive a questionnaire about the manner of the Department of Motor Vehicle employees.
 - In order to determine attitudes about the Medicare Drug Plan, a random sample is drawn so that each age group (65-70, 70-75, 75-80, 80-85) is represented in the proportion to its percentage in the population.

- (e) In choosing respondents for a survey about a proposed recycling program in a large city, interviewers choose homes to survey based on rolling a die. If the die shows a 1, the house is selected. If the house shows a 2-6, the interviewer moves to the next house.
7. Which of the following is true of an experiment but not of an observational study?
 - (a) A cause-and-effect relationship can be more easily inferred.
 - (b) The cost of conducting it is excessive.
 - (c) More advanced statistics are needed for analysis after the data is gathered.
 - (d) By law, the subjects need to be informed that they are a part of the study.
 - (e) Possible confounding variables are more difficult to control.
 8. A study showed that persons who ate two carrots a day had significantly better eyesight than those who ate less than one carrot a week. Which of the following statements is (are) correct?
 - I. This study provides evidence that eating carrots contributes to better eyesight.
 - II. The general health consciousness of people who eat carrots could be a confounding variable.
 - III. This is an observational study and not an experiment.

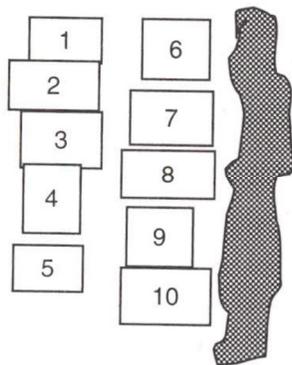
(a) I only (b) III only (c) I and II only (d) II and III only (e) I, II, and III
 9. Which of the following situations is a cluster sample?
 - (a) Survey five friends concerning their opinions of the local hockey team.
 - (b) Take a random sample of five voting precincts in a large metropolitan area and do an exit poll at each voting site.
 - (c) Measure the length of time each fifth person entering a restaurant has to wait.
 - (d) From a list of all students in your school, randomly select 20 to answer a survey about Internet use.
 - (e) Identify four different ethnic groups at your school. From each group, choose enough respondents so that the final sample contains roughly the same proportions of each group as the school population.

FREE RESPONSE

1. You are interested in the extent to which ingesting Vitamin C inhibits getting a cold. You identify 300 volunteers, 150 of whom have been taking more than 1000 mg of vitamin C a day for the past month. You record the number of colds during the following month for each group and find that the vitamin C group had significantly fewer colds. Is this an experiment or an observational study? Explain. What do we mean in this case when we say that the findings are *significant*?
2. Design an experiment that employs a *complete randomized design* to study the question of whether or not taking large doses of vitamin C is effective in reducing the number of colds.
3. A survey of physicians found that some doctors gave a placebo rather than an actual medication to patients who experience pain symptoms for which no physical reason can be found. If the pain symptoms were reduced, the doctor concluded that there was no real physical basis for the complaints. Do the doctors understand *the placebo effect*? Explain.
4. Explain how you would use a table of random digits to help obtain a systematic sample of 10% of the names on an alphabetical list of voters in a community. Is this a random sample? Is it a simple random sample?
5. *The Literary Digest Magazine*, in 1936, predicted that Alf Landon would defeat Franklin Roosevelt in the presidential election that year. The prediction was based on questionnaires mailed to 10 million of its subscribers and to names drawn from other public lists. Those receiving the questionnaire were encouraged to mail back their ballot preference. The prediction was off by 19 percentage points. The magazine received back some 2.3 million ballots from the 10 million sent out. What are some of the things that might have caused the magazine to be so wrong (the same techniques had produced accurate predictions for several previous elections)? (Hint: Think about what was going on in the world in 1936)
6. Interviewers, after the 9/11 attacks, asked a group of Arab Americans if they trust the administration to make efforts to counter anti-Arab activities. If the interviewer was of Arab descent, 42% responded "yes" and if the interviewer was of non-Arab descent, 55% responded "yes." What seems to be going on here?
7. There are three classes of statistics at your school, each with 30 students. You want to select a simple random sample of 15 students from 90 students as part of an opinion-gathering project for your social studies class. Describe a procedure for doing this.
8. Question #1 stated, in part: "You are interested in the extent to which ingesting vitamin C inhibits getting a cold. You identify 300 volunteers, 150 of whom have been taking more than 1000 mg of

vitamin C a day for the past month, and 150 of whom have not taken vitamin C at all during the past month. You record the number of colds during the following month for each group and find that the vitamin C group had significantly fewer colds.” Explain the concept of *confounding* in the context of this problem and give an example of how it might have affected the finding that the vitamin C group had fewer colds.

9. A shopping mall wants to know about the attitudes of all the shoppers who visit the mall. On a Wednesday morning, the mall places 10 interviewers at a variety of places in the mall and asks questions of shoppers as they pass by. Comment on any bias that might be inherent in this approach.
10. Question #2 asked you to design a *completely randomized experiment* for the situation presented in question #1. That is, to design an experiment that uses treatment and control groups to see if the groups differed in terms of the number of colds suffered by users of 1000 mg a day of vitamin C and those that didn't use vitamin C. Question #8 asked you about possible *confounding variables* in this study. Given that you believe that both general health habits and use of vitamin C might explain a reduced number of colds, design an experiment to determine the effectiveness of vitamin C taking into account general health habits. You may assume your volunteers vary in their history of vitamin C use.
11. You have developed a weight-loss treatment that involves a combination of exercise and diet pills. The treatment has been effective with subjects who have used a regular dose of the pill of 200 mg, when exercise level is held constant. There is some indication that higher doses of the pill will promote even better results, but you are worried about side effects if the dosage becomes too great. Assume you have 400 overweight volunteers for your study, who have all been on the same exercise program, but who have not been on any kind of diet pill. Design a study to evaluate the relative effects of 200 mg, 400 mg, 00 mg, and 800 mg daily dosage of the pill.
12. You are going to study the effectiveness of three different SAT preparation courses. You obtain 60 high school juniors as volunteers to participate in our study. You want to assign each of the 60 students, at random to one of the three programs. Design a procedure for assigning students to the programs if (a) you want there to be an equal number of students taking each course. (b) you want each student to be assigned independently to a group. That is, each student should have the same probability of being in any of the three groups.
13. A researcher wants to obtain a sample of 100 teachers who teach in high schools at various economic levels and has access to a list of teachers in several schools for each of the levels. She has identified four such economic levels (A, B, C, and D) that comprise 10%, 15%, 45%, and 30% of the schools in which the teachers work. Describe what is meant by a *stratified random sample* in this situation and discuss how she might obtain it.
14. You are testing for sweetness in five varieties of strawberries. You have 10 plots available for testing. The 10 plots are arranged in two side-by-side groups of 5. A river runs along the edge of one of the groups of five plots something like the diagram shown below (the available plots are numbered 1-10).



You decide to control for the possible confounding effect of the river by planting one of each type of strawberry in plots 1-5 and one of each type in plots 6-10 (that is, you block to control for the river). Then, within each block, you randomly assign one type of strawberry to each of the five plots within the block. What is the purpose of randomization in this situation?

15. Look at problem #14 again. It is the following year, and you now have only two types of strawberries to test. Faced with the same physical conditions you had in problem 14, and given that you are concerned that differing soil conditions (as well as proximity to the river) might affect sweetness, how might you block the experiment to produce the most reliable results?
16. A group of volunteers, who had never been in any kind of therapy, were randomly separated into two groups, one of which received an experimental therapy to improve self-concept. The other group, the control group, received traditional therapy. The subjects were not informed of which

- therapy they were receiving. Psychologists who specialize in self-concept issues evaluated both groups after training for self-concept, and the self-concept scores for the two groups were compared. Could this experiment have been *double-blind*? Explain. If it wasn't *double-blind*, what might have been the impact on the results?
17. You want to determine how students in your school feel about a new dress code for school dances. One faction in the student council, call them group A, wants to word the question as follows: "As one way to help improve student behavior at school sponsored events, do you feel that there should be a dress code for school dances?" Another group, group B, prefers, "Should the school administration be allowed to restrict student rights by imposing a dress code for school dances?" Which group do you think favors a dress code and which oppose it? Explain.
 18. A study of reactions to different types of billboard advertising is to be carried out. Two different types of ads (call them Type I and Type II) for each product will be featured on numerous billboards. The organizer of the campaign is concerned that communities representing different economic strata will react differently to the ads. The three communities where billboards will be placed have been identified as Upper Middle, Middle, and Lower Middle. Four billboards are available in each of the three communities. Design a study to compare the effectiveness of the two types of advertising taking into account the communities involved.
 19. In 1976, Shere Hite published a book entitled *The Hite Report on Female Sexuality*. The conclusions reported in the book were based on 3000 returned surveys from some 100,000 sent out to, and distributed by, various women's groups. The results were that women were highly critical of men. In what way might the author's findings have been biased?
 20. You have 26 women available for a study: Annie, Betty, Clara, Darlene, Edie, Fay, Grace, Helen, Ina, Jane, Koko, Laura, Mary, Nancy, Ophelia, Patty, Quincy, Robin, Suzy, Tina, Ulla, Vivien, Wanda, Xena, Yolanda, and Zoe. The women need to be divided into 4 groups for the purpose of a study. Explain how you could use a table of random digits to make the needed assignments.