

Multiple Choice

1. You are doing a research project on attitudes toward fast food and decide to use as your sample the first 25 people to enter the door at the local FatBurgers restaurant. Which of the following is true of this sample?
- B
- a. It is a systematic sample.
 - b. It is a convenience sample.
 - c. It is a random sample.
 - d. It is a simple random sample.
 - e. It is a self-selected sample.
2. What are the four key components of an experiment?
- D
- a. Control, replication, placebo, and randomization.
 - b. Replication, placebo, randomization, and comparison.
 - c. Sampling, replication, randomization, and comparison.
 - d. Control, replication, comparison, and randomization.
 - e. Control, replication, sampling, and comparison.
3. A double-blind design is important in an experiment because
- E
- a. There is a natural tendency for subjects in an experiment to want to please the researcher.
 - b. It helps control for the placebo effect.
 - c. 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.
 - d. Subjects in a study might react differently if they knew that they were receiving an active treatment or placebo.
 - e. All of the above are reasons why an experiment should be double-blind.
4. Data were collected in 20 cities on the percentage of women in the workforce. Data were collected in 1990 and again in 1994. Gains, or losses, in this percentage were the measurement upon which the studies/conclusions were to be based. What kind of design was this?
- E
- I. A paired data design
 - II. An observational study
 - III. 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

5. 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

B

- a. Completed randomized
- b. Blocked by gender
- c. Completely randomized, blocked by gender
- d. Randomized, blocked by gender and type of medication
- e. A matched pairs design

6. 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?

A

- a. Write the names 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.
- b. Assuming that students are randomly assigned to classes, select two classes at random and include those students in your sample.
- c. 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.
- d. Select the first 40 seniors to pass through the cafeteria door at lunch.
- e. Randomly select 10 students from each of the four senior calculus classes.

7. Which of the following is (are) important in designing an experiment?

D

- 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 large number of subjects to control for small-sample variability
- a. I only
 - b. I and II only
 - c. II and III only
 - d. I, II, and III
 - e. II only

8. Which of the following is true of an experiment but not of an observational study?

A

- 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 are gathered.
- d. By law, the subjects need to be informed that they are part of a study.
- e. Possible confounding variables are more difficult to control.

9. 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.

D

- a. I only
- b. III only
- c. I and II only
- d. II and III only
- e. I, II, and III

10. 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 to be seated.
- 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 respondent so that the final sample contains roughly the same proportion of each group as the school population.

B

Free Response

11. Your local pro football team has just suffered a humiliating defeat at the hands of its archrival. A local radio sports talk show conducts a call-in poll on whether the coach should be fired. What is the poll likely to find?

The poll is likely to find (overwhelmingly) that respondents think the coach should be fired. This is a voluntary response poll. That means we are most likely to hear from people who feel strongly about the issue. Fans who bother to call in are most likely upset with their team's loss and are looking for someone to blame, i.e. the coach.

* A self-selecting non-random sample is likely to exhibit response bias.

12. It is known that diet and exercise both influence weight loss. 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 taking any kind of diet pill. It is your job to design an experiment to evaluate the relative effects of a 200 mg, 400 mg, 600 mg, and 800 mg daily dosage of the pill.

a. List the experimental units, factors, levels, and treatments for the experiment.

experimental units (subjects) = 400 overweight volunteers who have all been on the same exercise program

factors: dosage of weight loss treatment pills

levels: 200mg, 400mg, 600mg, 800mg. of the weight loss treatment pills
 (T1) (T2) (T3) (T4)

4 treatments (same as levels)

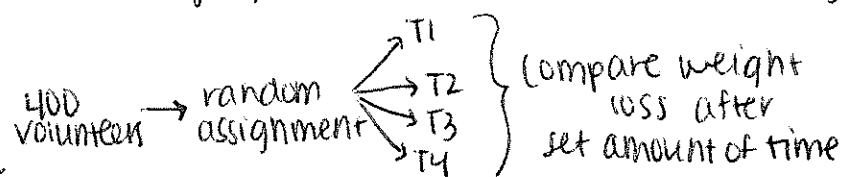
b. Using the principles of design, describe your experiment.

compare: we are comparing the effects of different dosages of weight loss treatment pills on weight loss.

random assignment: Label 4 identical slips of paper each with one of the 4 treatment options (T1 = 200 mg, T2 = 400 mg, T3 = 600 mg, T4 = 800 mg). Place in a hat and mix thoroughly. Have each participant come up, one at a time, pull a slip from the hat, replace the slip, and mix thoroughly again, until all participants have pulled a slip. They are each assigned to the treatment on the slip they pulled from the hat. Be sure there are at least 2 participants per treatment, or repeat the process until this condition is met.

control: all volunteers are doing the same exercise program, all are overweight, and none were previously taking a diet pill.

replication: at least 2 subjects per treatment.



13. You are interested in studying 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.

a. Is this an experiment or an observational study? Explain.

It is an observational study because the researcher did not impose a treatment (taking vitamin C or not); they simply observed the outcomes of two groups with one different characteristic (vitamin C intake). Participants self-selected to be in the vitamin C or no vitamin C group.

b. Design an experiment that employs a completely randomized design to study the question of whether taking large doses of vitamin C is effective in reducing the number of colds.

Compare: We are comparing the effects of taking vs. not taking vitamin C on inhibition of getting a cold (# of colds).

random assignment: Have each participant flip a coin. If they flip heads, they take vitamin C daily. If they flip tails, they take no vitamin C. Make sure both treatments have at least 2 subjects or repeat the process until this condition is met.

control: all subjects are volunteers participating during the same 30 days.

replication: at least 2 subjects per treatment group.

