

AP Statistics

For the following questions: Identify whether it is an experiment or an observation study/survey. If experiment: identify experimental design, experimental units, factors & levels, response variable, and blocks (if any). If study/survey, identify sampling method and one possible source of bias.

1) In marketing children's products, it's extremely important to produce television commercials that hold the attention of the children who view them. A psychologist hired by a marketing research firm wants to determine whether differences in attention span exist among advertisements for different types of products. Fifteen children under 10 years of age are randomly asked to watch one 60-second commercial for one of three types of products, and their attention spans are measured in seconds.

2) Upon reconsidering the above problem, the psychologist decides that the age of the child may affect the attention span. Consequently, the psychologist randomly assigns fifteen 10-year-olds, fifteen 8-year-olds, fifteen 6-year-olds, and fifteen 4-year olds to watch one of the commercials, and their attention spans are measured.

3) An economist wants to determine if differences exist among the salaries of university professors in different departments. Data is collected from a random sample of six professors from each of the departments of business, history, and psychology.

4) The editor of the student newspaper was in the process of making some major changes in the newspaper's layout. He was also contemplating changing the typeface of the print used. To help him make a decision, he asked six individuals to read four newspaper pages, with each page printed in a different typeface. If the reading speed differed, then the typeface that was the fastest would be used. However, if there was not enough evidence to allow the editor to conclude that such differences existed, the current typeface would be continued. (Where should randomization be implemented?)

5) For many years automobile insurance companies have charged young men higher premiums, reflecting this group's relatively poor driving record. An executive in the insurance industry believes that different premiums should be charged according to age for all drivers, because drivers in some age groups drive considerably more than others. To examine this issue, 50 young (25- to 40-year olds), 50 middle-age (40- to 55-year-olds), and 50 older (over 55-years-old) drivers were questioned concerning the number of miles they drove in the previous 12 months.

6) In a recent report, a group of scientists claimed that Americans are consuming an excessive amount of selenium in their diets. The National Science Foundation has stated that the safe upper limit is 200 micrograms per day. In order to determine the extent of the problem in Plano, researchers divided the town into five regions based on economic levels and drew random samples of households from each region. They then interviewed an adult at the residence and measured their daily consumption of selenium.

Name: _____

Experimental Design Activity 2

AP Statistics

For questions 1 & 2:

- a) What is/ are the explanatory variable(s) or factor(s) & their levels?
- b) What is the response variable?
- c) How many treatment groups are there?

1) A new dog food, specially designed for dogs with kidney problems, has been developed. A veterinarian wants to test this new food against another dog food currently on the market to see if it improves the dog's health. Thirty dogs with kidney problems were recruited to participate in the study. They were fed either the "new" or "old" food for six months and the improvement in kidney health was rated.

2) Does talking while walking slow you down? In a study reported in the journal *Physical Therapy*, the cadence was measured for subjects who were walking (using no device, a standard walker, or a rolling walker) and required (or not required) to respond to a signal while walking.

3) Researchers have developed a new insulin inhaler to replace daily insulin shots needed by patients with diabetes. Design an experiment to test the effects of this new insulin treatment on a volunteer group of 100 diabetes patients.

4) Can the experiment in question 3 be blinded? Explain.

5) An agricultural researcher is interested in finding out the effect of three different fertilizers on a certain variety of corn. Design an experiment to test this. What types of things could be considered confounding variables?