

HW 9.12

1. State if the following is an observational study, a survey, or an experiment, and give a reason for your answer.
 - a. Linda wanted to know if it is easier for students to memorize a list of common three-letter words (such as *fly*, *pen*, and *red*) than a list of three-letter nonsense words (such as *vir*, *zop*, and *twq*). She randomly selected 28 students from all tenth graders in her district. She put 14 blue and 14 red chips in a jar, and without looking, each student chose a chip. Those with red chips were given the list of common words; those with blue chips were given the list of nonsense words. She gave all students one minute to memorize their lists. After the minute, she collected the lists and asked the students to write down all the words that they could remember. She recorded the number of correct words recalled.

 - b. Ken wants to compare how many hours a week that sixth graders spend doing mathematics homework to how many hours a week that eleventh graders spend doing mathematics homework. He randomly selects ten sixth graders and ten eleventh graders and records how many hours each student spent on mathematics homework in a certain week.

2. Is the following an observational study or an experiment? Explain your answer.
 - a. A study is done to see how high soda will erupt when mint candies are dropped into two-liter bottles of soda. You want to compare using one mint candy, five mint candies, and 10 mint candies. You design a cylindrical mechanism, which drops the desired number of mint candies all at once. You have 15 bottles of soda to use. You randomly assign five bottles into which you drop one candy, five into which you drop five candies, and five into which you drop 10 candies. For each bottle, you record the height of the eruption created after the candies are dropped into it.

 - b. You want to see if fifth-grade boys or fifth-grade girls are faster at solving Ken-Ken puzzles. You randomly select twenty fifth-grade boys and twenty fifth-grade girls from fifth graders in your school district. You time and record how long it takes each student to solve the same Ken-Ken puzzle correctly.

3. Suppose that in your health class you read two studies on the relationship between eating breakfast and success in school for elementary school children. Both studies concluded that eating breakfast causes elementary school children to be successful in school.
 - a. Suppose that one of the studies was an observational study. Describe how you would recognize that they had conducted an observational study. Were the researchers correct in their causal conclusion?
 - b. Suppose that one of the studies was an experiment. Describe how you would recognize that they had conducted an experiment. Were the researchers correct in their causal conclusion?
4. Data from a random sample of 50 students in a school district showed a positive relationship between reading score on a standardized reading exam and shoe size. Can it be concluded that having bigger feet causes one to have a higher reading score? Explain your answer.

Use the following scenarios for Problems 5–7.

- A. Researchers want to determine if there is a relationship between whether or not a woman smoked during pregnancy and the birth weight of her baby. Researchers examined records for the past five years at a large hospital.
 - B. A large high school wants to know the proportion of students who currently use illegal drugs. Uniformed police officers asked a random sample of 200 students about their drug use.
 - C. A company develops a new dog food. The company wants to know if dogs would prefer its new food over the competitor's dog food. One hundred dogs, who were food deprived overnight, were given equal amounts of the two dog foods: the new food versus the competitor's food. The proportion of dogs preferring the new food versus the competitor's was recorded.
5. Which scenario above describes an experiment? Explain why.
 6. Which scenario describes a survey? Will the results of the survey be accurate? Why or why not?

7. The remaining scenario is an observational study. Is it possible to perform an experiment to determine if a relationship exists? Why or why not?

Answers

- 1) a) Experiment; Answers will vary b) Observational study; Answers will vary
2) a) Experiment; Answers will vary b) Observational study; Answers will vary
3) a) Students were not assigned to eat breakfast or not. No; Answers will vary b) Students were assigned to eat breakfast or not. Yes; Answers will vary
4) No. It's not an experiment. People were not assigned a shoe size. Their shoe size and reading level were observed.
5) C; Answers will vary
6) B; Answer will vary
7) No. Ethically women can not be assigned to smoke during pregnancy.