Recall two of the teachers from Student Activity Sheet 1 (Question 13) who were interested in the best test format for student achievement. Mrs. Johnson flipped a coin to decide whether a student would take a multiple-choice or fill-in-the blank exam. Mr. McDonald asked students which format they preferred.

1. These teachers chose to study the population of all students in their classes. This approach is called a census. The U.S. government conducts a census every 10 years. List some things you know about the U.S. Census.

2. Rather than go through the time and expense of a census, researchers usually choose to sample the population. There are a variety of sampling techniques. Define the following common techniques with help from your teacher or by researching other resources.
   a. Simple random sampling
   b. Stratified random sampling
   c. Systematic sampling
   d. Cluster sampling
   e. Convenience sampling

3. Suppose the school board wished to see whether the age of the student affects test achievement. The testing coordinator separated the roster of high school students into freshmen, sophomores, juniors, and seniors and randomly selected 20 students from each classification. She then flipped a coin to determine which test format each student would receive and then compared the results as follows:
   • freshmen who took the multiple-choice test compared to freshmen who took the fill-in-the-blank exam,
   • multiple-choice sophomores compared to fill-in-the-blank sophomores,
   • multiple-choice juniors compared to fill-in-the-blank juniors, and
   • multiple-choice seniors compared to fill-in-the-blank seniors.

Randomization still occurred because the testing coordinator flipped the coin to assign the test format to each student. This approach is an example of what type of sampling technique? Explain your thinking.
4. Mr. McDonald expanded his study to the entire school. He collected a student roster from the office and used the random number generator on his calculator to select one of the first 50 students on the list. Mr. McDonald then selected every 50th student on the list after this initial student for his sample. The calculator generated the number 32. Which students on the roster are the first five in his sample? What type of sampling technique is this? Explain your thinking.

32, 82, 132, 182, 232

5. Coach Smith wants to know whether students would pay for the privilege of parking their cars in the lot closest to the school. He surveyed students getting on the buses while he monitored bus loading each afternoon. What type of sampling technique is this? What do you think of his plan?

CONVENIENCE

6. A large university wants to find out whether it is adequately serving the needs of its students who live off campus. The campus is surrounded by a large number of apartment complexes. The researchers randomly selected three of the complexes that seemed to contain a diverse group of residents who adequately reflect the student body as a whole, and they surveyed these residents about campus services. What type of sampling technique is this? Why do you think the university chose this method? Explain your thinking.

CLUSTER

7. Recall the research from Student Activity Sheet 1 (Question 19) in which scientists analyzed the scalp hair samples from 22 participants with epilepsy and 23 participants without epilepsy, checking for differences in levels of copper, iron, zinc, magnesium, and calcium. The scientists were concerned about previous research that showed conflicting results. They speculated that other differences in the study group, besides the presence or absence of epilepsy, could have caused these mixed results. The scientists attempted to control some of these other differences by gathering all participants from the same region of Turkey (indicating similar dietary habits) and separating the participants into the following groups:

- males with epilepsy,
- males without epilepsy,
- females with epilepsy, and
- females without epilepsy.

This is an example of what kind of sampling? Explain your thinking.

STRATIFIED
Statistical Studies: Statistical Investigations
III. A Student Activity Sheet 4: Sampling Design and Methods

8. Recall the study from Student Activity Sheet 1 (Question 19) that tested the effect of replacing rabbits' soybean diet with *Gliricidia sepium* Leaf Meal (GLM). Twenty-five young rabbits were randomly assigned to receive either 0%, 5%, 10%, 15%, or 20% GLM. Suppose, rather than random assignment, the scientists chose the following method:

The research assistant who was in charge of gathering rabbits went in the barn and assigned the first five rabbits he could catch to the 0% group. He assigned the next five that he caught to the 5% group, and so on.

What type of sampling technique is this? What do you think of his plan?

9. REFLECTION: During busy political seasons, many opinion polls are conducted. In a presidential race, how do you think the participants in polls are generally selected? Discuss any issues regarding simple random, stratified, systematic, cluster, and convenience sampling in these polls. What about other types of polls, besides political?

10. Describe briefly how each technique could be used in the potato chip investigation. Which techniques are the most appropriate?

- Simple random sampling
- Stratified random sampling
- Systematic sampling
- Cluster sampling
- Convenience sampling