Teacher PLAN 5 Lesson

SAMPLES AND **STATS**

Grades 9-10

Skills and Objectives:

- Students will identify different sampling methods.
- Students will design and conduct surveys using sampling methods.

Suggested Groupings:

Partners, small groups

Getting Started:

● Have students share any prior knowledge of **sampling** they may have. Discuss the idea that sampling makes it possible to gather information about a population when surveying every member is impossible or impractical. Educators, advertisers, and policymakers all use information gathered through sampling. The U.S. Census Bureau also develops and uses sampling techniques to gather information about the U.S. population. For example, while the Census Bureau distributes both a short and long census questionnaire, only one in six households will get a long form for Census 2000. This sample is large enough to provide the data to accurately describe the U.S. population.

● Explain to students that this activity will introduce them to a variety of sampling methods and the multiple steps involved in the process of conducting a survey to gather statistical information. Make sure they understand that the sampling process they will use to obtain data is much simpler than the methods used by the U.S. Census Bureau and others.

Using the Activity Worksheets:

● Distribute copies of pages 16 and 17 to students. Have them read and complete the activity on page 16. Alternatively, you may wish to do this activity as a class.

● Then have students read and discuss the section on bias at the top of page 17. Ask: **Can you come up with your own example of a biased sample?** (For example, if you conduct a **survey** of your classmates by e-mail, you will automatically exclude all class members who do not have access to e-mail.) **What steps can researchers take to ensure that the studies they design are not biased?**

● Before students begin, discuss the difference between the type of survey the Census Bureau conducts and a poll. The Census Bureau uses surveys to collect and analyze social, economic, and geographic data. A **poll** is a survey that is used to measure attitudes and opinions. Go over these steps with them. **1.** Choose a survey question. Make sure students choose a question that asks for factual information, like age or education level, rather than an attitude or opinion. **2.** Identify the target population and sample size. **3.** Decide on the sample method. **4.** Conduct the survey and interpret, tabulate, and graph or map results.

Chalkboard Definitions

sampling: using a finite part of a statistical population for study, in order to gain information about the whole.

survey: a set of questions asked of a specific population to collect data for analysis.

poll: a survey that measures attitudes and opinions.

● To demonstrate, choose your own question and do a quick survey with your students.

Wrapping Up:

● Have each group present their surveys and results. Ask a spokesperson for each group to discuss the target population, sample size, and sample method used in the survey. Have students share their conclusions.

● Have students conduct further research about the sampling methods presented here. Have the class agree on one survey question. Divide the class into three groups, and have each group use a different sampling method. Be sure each group uses the same size sample. Then invite the groups to compare results. Alternatively, student groups could use the same sampling method on different sample sizes.

● Students can visit the U.S. Census Bureau Web site (www.census.gov) to get information from surveys conducted on such subjects as computer use, crime, education, etc. Click on "Subjects A-Z" and choose "S" then "Surveys."

Answers:

Page 16:

1. Cluster sampling.
2. Random sampling.
3. Systematic sampling.

Samples and **Stats**

Sampling is a scientific technique used to obtain as accurate a figure or measurement as possible, when an exact count cannot be taken. By measuring a scientifically selected portion of a population, it is possible to describe the characteristics of the entire population.

Below is a chart describing three different scientific sampling methods. The U.S. Census Bureau's long form is an example of systematic sampling. **For Census 2000, a systematic sampling of approximately 1 in every 6 households will receive the long form, and an average of 5 out of every 6 households will receive the short form.** Although the long form doesn't go to every household, information from these forms can be used to accurately describe the entire U.S. population.

Here are three different sampling methods:

Random Sampling	Cluster Sampling	Systematic Sampling
Each individual in the population has an equal chance of being selected. **Example:** To take a random sample of students in your school, you could write the name of each student on a slip of paper, then choose slips at random.	Groups, rather than individuals, are randomly selected. **Example:** You might randomly select certain classes, then interview every student in only those classes.	A rule, or pattern, that applies to a population is used to make selections. **Example:** Using an alphabetical list of students, count off by 6, and select every 6th student on the list.

Test your understanding of different sampling techniques. Draw lines to match the sampling methods with their types.

1. Choose any three pages from the telephone book at random, and call everyone on those pages.

2. Choose 100 telephone numbers at random from the entire book.

3. Choose every 100th listing in the telephone book.

a. Random Sampling

b. Systematic Sampling

c. Cluster Sampling

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Samples and **Stats** (continued)

When choosing a sampling method, you need to beware of hidden biases. For example, imagine that you want to know if teenagers today are taller than teenagers in the past. You've found information about the average height of students in your school in 1940 and 1970. Now you need to find out the average height of students in your school today. You probably don't want to get the height data from a sample consisting of members of the school basketball team! Why not?

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Design your own sample survey.

1. Acting as your school's census bureau, identify a characteristic of interest or importance to your school and choose a survey question. (Topic examples: transportation to and from school, team sports or other extracurricular activities, foreign languages studied, etc.) For some of these topics, you may be able to check the accuracy of your survey results against actual tallies your school keeps. Be sure not to ask questions about attitudes or opinions.

Write your topic and survey question here:

_____

_____

2. Choose your target population. The target population is the group of people to whom you want the sample survey to apply. For instance, a survey about a school-related question could apply to the students in your grade or to the whole student body. Make sure you survey a good sample of your target population. (For example, if your survey applies to a student body of 400, you might want to talk to at least 10%, or 40 people.)
Write your target population and sample size here: _____

3. Based upon the steps above, which sampling method would you choose for your survey? Why?

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4. Now conduct your sample survey and tabulate the results. Then organize your results into a graph or table and add a narrative summary. Share your graph, or table and summary, with the class.