

8.2 Data Gathering

Who uses this?

Researchers can use surveys to make predictions about the population of fish in a lake.

Lesson Objective(s):

- Explain how random samples can be used to make inferences about a population.
- Use probability to analyze decisions and strategies.

Surveys are often conducted to gather data about a population.

the entire group of people or objects that you want information about.

a survey of an entire population. When it is too difficult, expensive, or time-consuming to conduct a census, or part of the population, is surveyed.

When every member of a population has an equal chance of being selected for a sample, the sample is called or *probability sample*. Random samples are most likely to be representative of a population and are preferred over non-random samples such as *convenience samples* and *self-selected samples*.

Wildlife Application

A wildlife researcher is studying the effects of certain pollutants on different types of fish in a lake. Because it is difficult or impossible to catch every fish in the lake, the researcher decides to use a random sample. She catches 5 groups of 10 fish each from random spots in the lake, examines them, and returns them to the lake. The table shows the numbers of perch and walleye from each group.

- A** Identify the population and sample in the researcher's study.

	Perch	Walleye
Group 1		
Group 2		
Group 3		
Group 4		
Group 5		

- B** Use the table to estimate the ratio of perch to walleye in the lake.

A non-random sample can result in a *biased sample*. a sample that may not be representative of a population. In a biased sample, the population can be underrepresented or overrepresented.

Underrepresented _____

Overrepresented _____

Random samples are less likely to be biased, while nonrandom samples are more likely to be biased. Bias in a sample is not always obvious at first glance.

EXAMPLE 2

Identifying Potentially Biased Samples

Decide whether the sampling method could result in a biased sample. Explain your reasoning

- A** A survey is conducted by calling 100 people randomly chosen from the phone book and asking how long each person has lived at the current residence.
- B** A survey of students at a school is conducted by contacting every 10th student from the complete roster and asking whether he or she plans to go to college.

EXAMPLE 3

Analyzing a Survey

The owner of a health club wants to determine the percent of adults in his area who exercise for at least 20 minutes three times a week. He asks the first 25 adults he sees at a mall on a weekday around 10:00 A.M. Are the results of the survey likely to be representative of the population? Explain.

**Do you exercise for
at least 20 minutes
three times a week?**

Yes 32%

No 68%

_____ a number that describes a sample. _____ a number that describes a population. You can use a statistic from a survey to estimate a parameter. In this way, surveys can be used to make predictions about a population.

EXAMPLE 4

Making Predictions

In a survey of 50 students at a high school, 32 students said that they plan to attend the homecoming dance. The school has 720 students.

- A** Which of these numbers is a statistic, and which is a parameter?
- B** Predict the number of students who plan to attend the homecoming dance.

A strong understanding of statistics is important for decision-making. An understanding of the relative importance of statistical data allows for making good, informed decisions. A poor understanding of statistics can be costly.

EXAMPLE 5**Manufacturing**

A production manager conducts a product inspection of a factory that has 10 machines, each assembling 1,000 widgets per day. She hires an inspector to choose a random time in the workday and check the next 25 widgets that are made at a random machine. The inspector finds that 5 of those widgets have defects. Since 20% is too high an error rate, the manager decides to shut the factory down until the problem can be fixed. Did the manager make a good decision? Why or why not?