LESSON 6.4

Study Guide

For use with the lesson "Select and Draw Conclusions from Samples"

GOAL **Study different sampling methods for collecting data.**

Vocabulary

A **population** is a group of people or objects that you want information about.

A **sample** is a subset of the population.

An **unbiased sample** is representative of the population you want information about. A sample that overrepresents or underrepresents part of the population is a **biased sample.**

The **margin of error** gives a limit on how much the responses of a sample would differ from the responses of a population. When a random sample of size n is taken from a large population, the margin of error is approximated by this formula:

Margin of error $= \pm \dfrac{1}{\sqrt{n}}$

This means that if the percent of the sample responding a certain way is p (expressed as a decimal), then the percent of the population that would respond the same way is likely to be between

$p - \dfrac{1}{\sqrt{n}}$ and $p + \dfrac{1}{\sqrt{n}}$.

EXAMPLE 1

Classify samples

Lunch Habits A business reporter wants to survey workers about where they eat lunch during a typical work week. Identify the type of sample described.

  a. The reporter writes a column asking workers to call a special phone number and identify where they eat lunch during a typical work week.

  b. The reporter asks everyone in the newsroom where they eat lunch during a typical work week.

Solution

  a. The workers can choose whether or not to respond. So, the sample is a self-selected sample.

  b. The reporter selected workers that are easily accessible. So, the sample is a convenience sample.

Exercise for Example 1

  1. A real estate agent wants to know if first-time home buyers used the Internet to research home listings. The real-estate agent calls every fifth first-time home buyer and asks them if they used the Internet to research home listings. Identify the type of sample described.

LESSON 6.4 | ## Study Guide *continued*
For use with the lesson "Select and Draw Conclusions from Samples"

EXAMPLE 2 | ## Identify biased samples

Tell whether each sample in Example 1 is *biased* or *unbiased*. *Explain* your reasoning.

Solution

a. The sample is biased because the sample is self-selected and it may not be representative of the population the reporter wants information about.

b. The sample is biased because a convenience sample is not representative of the population the reporter wants information about.

EXAMPLE 3 | ## Find a margin of error

Lunch Habits In a survey of 990 workers, 30% said they eat at home during a typical work week.

a. What is the margin of error for the survey?

b. Give an interval that is likely to contain the exact percent of all workers who eat at home during a typical work week.

Solution

a. Use the margin of error formula.

$$\text{Margin of error} = \pm \frac{1}{\sqrt{n}} \qquad \text{Write margin of error formula.}$$

$$= \pm \frac{1}{\sqrt{990}} \qquad \text{Substitute 990 for } n.$$

$$\approx \pm 0.032 \qquad \text{Use a calculator.}$$

The margin of error for the survey is about $\pm 3.2\%$.

b. To find the interval, subtract and add 3.2% to the percent of workers surveyed who eat at home during a typical work week.

$$30\% - 3.2\% = 26.8\% \qquad\qquad 30\% + 3.2\% = 33.2\%$$

It is likely that the exact percent of all workers who eat at home during a typical work week is between 26.8% and 33.2%.

Exercises for Examples 2 and 3

2. Tell whether the sample in Exercise 1 is *biased* or *unbiased*. *Explain* your reasoning.

3. In Example 3, 29% of the 990 workers surveyed said they eat at their desks during a typical work week. Give an interval that is likely to contain the exact percent of all workers who eat at their desks during a typical work week.

4. In a survey of 1200 first-time home buyers, 41% said they used the Internet to research home listings. What is the margin of error? Give an interval that is likely to contain the exact percent of all first-time home buyers who used the Internet to research home listings.