

8.4 Samples and Populations

Essential Question How can you use a survey to make conclusions about the general population?



1 ACTIVITY: Interpreting a Survey

Work with a partner. Read the newspaper article. Analyze the survey by answering the following questions.

- The article does not say how many “teens and young adults” were surveyed. How many do you think need to be surveyed so that the results can represent all teens and young adults in your state? in the United States? Explain your reasoning.
- Outline the newspaper article. List all of the important points.
- Write a questionnaire that could have been used for the survey. Do not include leading questions. For example, “Do you think your cell phone plan is restrictive?” is a leading question.

The Daily Times

VOL. 01 No. 279 WEDNESDAY, OCTOBER 6, 2010

TEXT MESSAGING SURVEY RESULTS

A survey reports that almost one-third of teens and young adults believe that their text messaging plans are restrictive.

survey, the average number of text messages sent per day is between 6 and 7.

About 40% say their plans lead to higher cell phone bills. According to those participating in the

The majority of survey participants say they would send more text messages if their cell phone plans were not as restrictive.

2 ACTIVITY: Conducting a Survey

Work with a partner. The newspaper article in Activity 1 states that the average number of text messages sent per day is between 6 and 7.

- Does this statement seem correct to you? Explain your reasoning.
- Plan a survey to check this statement. How will you conduct the survey?
- Survey your classmates. Organize your data using one of the types of graphs you have studied in this chapter.
- Write a newspaper article summarizing the results of your survey.



3 ACTIVITY: Conducting and Summarizing a Survey

Work with a partner.

- Plan a survey to determine how many of the following texting shortcuts people know.
- Write a questionnaire to use in your survey.
- In the survey, try to determine whether *teenagers* or *people over 30* know more of the shortcuts.
- Conduct your survey. What can you conclude from the results? Do the results confirm your prediction?



Texting Shortcuts

R	Are	U	You
4	For	L8R	Later
SUP	What's up	TTYL	Talk to you later
PLZ	Please	BRB	Be right back
C	See	LOL	Laugh out loud
IDK	I don't know	BFF	Best friends forever
JK	Just kidding	THX	Thanks
2NITE	Tonight	GR8	Great
QPSA?	Que Pasa?	4COL	For crying out loud

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you use a survey to make conclusions about the general population?
5. Find a survey in a newspaper, in a magazine, or on the Internet. Decide whether you think the conclusion of the survey is correct. Explain your reasoning.



"I'm sending my Mom a text message for Mother's Day."



"2 GR8 2 ME 2 EVR B 4GOT10. XX00"

Practice

Use what you learned about samples and populations to complete Exercises 3–5 on page 372.

Key Vocabulary

population, p. 370
sample, p. 370

Key Idea

Samples and Population

A **population** is an entire group of people or objects. A **sample** is a part of the population.



All of the students in a school are a population.

A class is a part of an entire school.



All of the students in a class are a sample.

EXAMPLE 1 Identifying a Population and a Sample

Response	Residents
Favor road	533
Oppose road	267

An agency wants to know the opinions of county residents on the construction of a new road. The agency surveys 800 residents. Identify the population and the sample.

The population is all county residents. The sample consists of the 800 residents surveyed by the agency.

On Your Own

Now You're Ready
Exercises 6–9

- You want to know how many students in your school are going to the volleyball game. You survey 50 students. Ten are going to the game. The rest are not going to the game. Identify the population and the sample.

Key Idea

Reasonable Samples

A reasonable sample is

- selected at random,
- representative of the population, and
- large enough to provide accurate data.

The results of a reasonable sample are proportional to the results of the population. So, reasonable samples can be used to make predictions about the population.

EXAMPLE 2 Standardized Test Practice

You want to estimate the number of students in a high school who ride the school bus. Which sample is best?

- (A) 4 students in the hallway
- (B) All students in the marching band
- (C) 50 seniors at random
- (D) 100 students at random during lunch



Choice A is not large enough to provide accurate data.

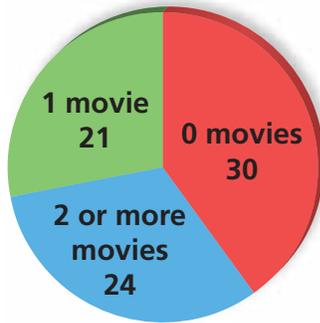
Choice B is not selected at random.

Choice C is not representative of the population because seniors are more likely to drive to school than other students.

Choice (D) is best. It is large and random.

EXAMPLE 3 Making Predictions

Movies per Week



You ask 75 randomly chosen students how many movies they watch each week. There are 1200 students in the school. (a) Predict the number n of students in the school who watch one movie each week. (b) Is the prediction appropriate? Explain.

- a. Find the fraction of students in the sample who watch one movie.

$$\frac{\text{Students who watch one movie}}{\text{Number of students in sample}} = \frac{21}{75}$$

Multiply to find n .

$$n = \frac{21}{75}(1200) = 336$$

About 336 students watch one movie each week.

- b. The sample is selected at random, representative of the population, and large enough to provide accurate data.

The sample is reasonable, so the prediction is appropriate.

On Your Own

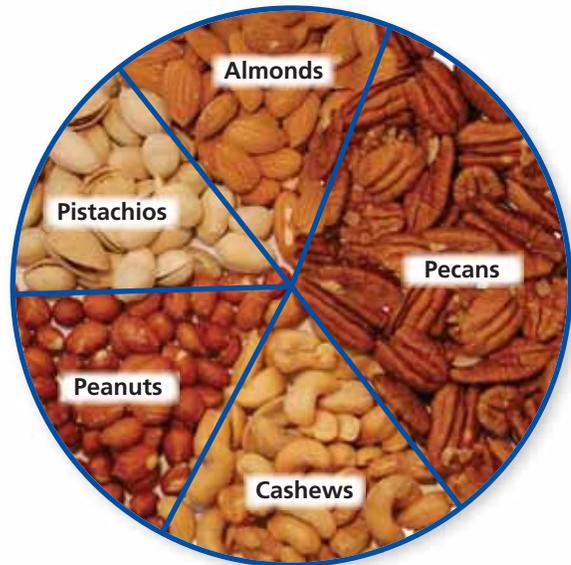
2. **WHAT IF?** In Example 2, you want to estimate the number of seniors in a high school who ride the school bus. Which sample should you use to make a prediction?
3. In Example 3, predict the number n of students in the school who watch two or more movies each week.

Vocabulary and Concept Check

- VOCABULARY** Why would you survey a sample instead of a population?
- CRITICAL THINKING** What should you consider when conducting a survey?

Practice and Problem Solving

The circle graph shows the results of a survey of 960 adults randomly chosen from different parts of the United States. In the survey, each adult was asked to name his or her favorite nut.



- Do you think the results would be similar if the survey were conducted using middle school students? children in first grade? Explain your reasoning.
- What other type of data display could be used to show the data?
- Plan a survey to check the results of the survey. How could you conduct the survey so that the people surveyed would be chosen at random?

Identify the population and the sample.

1 6. Residents of New Jersey (orange outline of NJ) Residents of Ocean County (orange outline of NJ with Ocean County highlighted)

7.  150 Quarters  All quarters in circulation

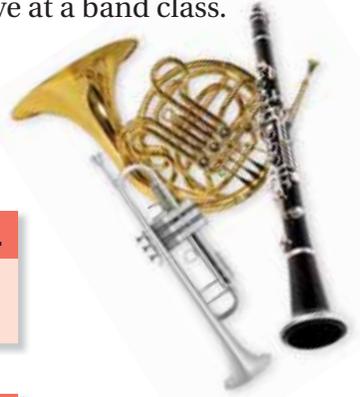
8.  5 Ants  Colony of ants

9.  All books in library  10 library books

- 3 10. **ERROR ANALYSIS** Consider the information given in Example 3. Describe and correct the error in predicting the number n of students in the school who watch zero movies each week.

X $n = \frac{45}{75}(1200)$
 $n = 720$

- 2 11. **INSTRUMENT** You want to know the number of students in your school who play a musical instrument. You survey the first 15 students who arrive at a band class.
- What is the population of your survey? the sample?
 - Is the sample reasonable? Explain.



Which sample is better for making a prediction? Explain.

12. **Predict the number of students in a school who like gym class.**

Sample A	A random sample of 8 students from the yearbook
Sample B	A random sample of 80 students from the yearbook

13. **Predict the number of defective pencils produced per day.**

Sample A	A random sample of 500 pencils from 20 machines
Sample B	A random sample of 500 pencils from 1 machine

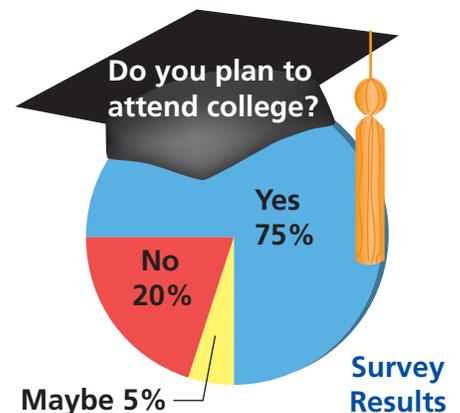
Determine whether you would survey the population or a sample. Explain.

- You want to know the average height of seventh-graders in the United States.
- You want to know the favorite types of music of students in your homeroom.
- You want to know the number of students in your state who have summer jobs.

Ticket Sales	
Adults	Students
522	210

17. **THEATER** A survey asked 72 randomly chosen students if they were going to attend the school play. Twelve said yes. Predict the number of students who attend the school.

- CRITICAL THINKING** Explain why 200 people with email addresses may not be a random sample.
- Reasoning** A guidance counselor surveys a random sample of 60 out of 900 high school students. Using the survey results, the counselor predicts that approximately 675 students plan to attend college. Do you agree with her prediction? Explain.



Fair Game Review what you learned in previous grades & lessons

Write the fraction as a percent. (*Skills Review Handbook*)

20. $\frac{5}{8}$

21. $\frac{5}{16}$

22. $\frac{21}{27}$

23. $\frac{36}{44}$

24. **MULTIPLE CHOICE** What is the volume of the cone? (*Section 7.4*)

- (A) $16\pi \text{ cm}^3$ (B) $108\pi \text{ cm}^3$
 (C) $48\pi \text{ cm}^3$ (D) $144\pi \text{ cm}^3$

