EXERCISES

For more practice, see *Extra Practice.*

Practice and Problem Solving

A Practice by Example

For each sample, find the sample proportion. Write it as a percent.

Example 1 (page 663)

1. 837 out of 1150 insurance applicants have no citations on their driving record.

2. 27 out of 60 shoppers prefer generic brands when available.

3. 532 out of 580 households own a color television set.

Example 2 (page 664)

Identify any bias in each sampling method.

4. A supermarket wants to find the proportion of shoppers who use reduced-price coupons. A manager interviews every shopper entering the greeting card aisle.

5. A maintenance crew wants to estimate how many of 3000 air filters in an office building need replacing. The crew examines five filters chosen at random on each floor of the building.

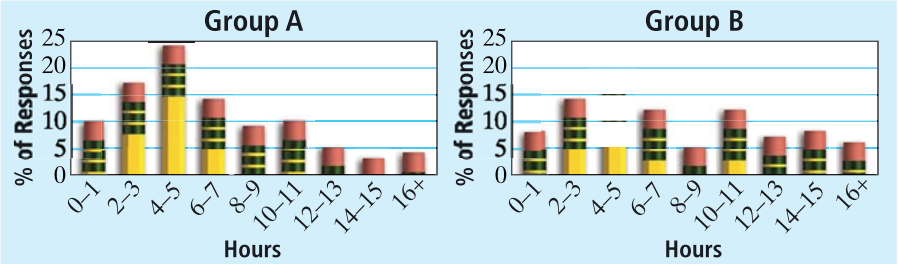
6. The student government wants to find out how many students have after-school jobs. A pollster interviews students selected at random as they board buses at the end of the school day.

Example 3 (pages 664–665)

7. In a survey, teenagers were asked the importance of "making your own things." The response scale ranged from 1 to 5, with 5 being extremely important. Which sample most likely was largest? Explain.

Sample	Score	Standard Deviation
A	3.6	1.2
B	3.8	1.0
C	3.8	0.5

8. The table below shows the results of a poll asking students, "How many hours a week would you say you spend doing academic homework?" Which sample most likely was smaller? Explain.



Example 4 (page 665)

Find the margin of error for the sample proportion, given each sample of size *n*.

9. $n = 200$ **10.** $n = 800$ **11.** $n = 1200$

Find the sample size that produces each margin of error.

12. $\pm 8\%$ **13.** $\pm 5\%$ **14.** $\pm 1\%$

Example 5 (page 666)

For each situation, find the margin of error for the sample. Then find an interval likely to contain the true population proportion.

15. Of 750 teenagers polled, 59% think boys and girls are portrayed as equals on television.

16. Of 400 teenagers surveyed, 62% do not plan to stay in their community after finishing their education.

B Apply Your Skills

Surveys **For each sample, find (a) the sample proportion, (b) the margin of error, and (c) the interval likely to contain the true population proportion.**

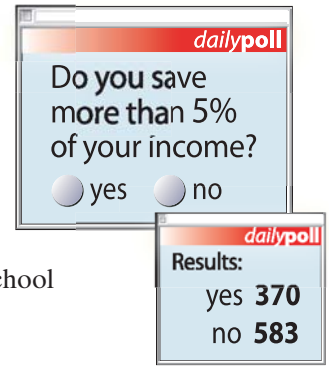
17. In a random sample of 408 grocery shoppers, 258 prefer one large trip per week to several smaller ones.

18. Of 500 teenagers surveyed, 460 would like to see adults in their community do more to solve drug problems.

19. In a survey of 32 people, 30 return a milk carton to the refrigerator immediately after using it.

20. In a survey of 16 people, one person never locks his car.

21. Writing Write a news article describing the sample proportion and margin of error for the poll results shown at the right.



22. Reasoning How is the margin of error affected if you double the sample size? Explain.

23. a. Data Collection Write a survey question to find out the number of students at your school who plan to continue their education after high school

b. Describe the sampling method you would use.

c. Conduct your survey.

24. Critical Thinking A sample proportion provides an estimate for the percent of an entire population that favors an event. Is a sample proportion an experimental or a theoretical probability? Explain.

25. Computer Use An online advertisement asks you to participate in a survey. The survey asks how much time you spend online each week. Identify any bias in this method. If appropriate, suggest a method more likely to produce a random sample.

Reading Math

For help with reading and solving Exercise 25, see p. 670.

An event occurs x times in a sample of size n. Find its sample proportion and margin of error.

26. $x = 96$, $n = 900$

27. $x = 20$, $n = 64$

28. $x = 100$, $n = 250$

29. $x = 273$, $n = 435$

C Challenge

30. a. It costs \$20 to interview each person for a survey. Find the cost to obtain a $\pm 3\%$ margin of error.

b. Critical Thinking Find the cost to obtain a $\pm 2\%$ margin of error. Why do you think polls with smaller margins of error are rare?

31. a. Elections A poll of 150 voters shows that a candidate is preferred by 56% of the voters while 44% prefer the opponent. Should the candidate be concerned? Explain.

b. A later poll of 600 voters shows the candidate is preferred by 55% of the voters. Should this candidate feel more or less confident, given the results of the second poll? Explain.

32. Wildlife Wild animal populations are often estimated through the use of the capture–tag–recapture method. Several animals are captured, tagged, and released back into the wild. The animals continue to roam freely. Then, some time later at the same site, several more animals are captured, and the number of tagged animals is recorded. An estimate of the population can then be calculated. This method of estimation assumes that the fraction of tagged animals in the second sample is equivalent to the fraction of tagged animals in the entire population.

$$\frac{\text{tagged animals in second sample}}{\text{animals in second sample}} = \frac{\text{tagged animals in population}}{\text{population } (P)}$$

Use the formula above to predict the black bear population of the northern coastal plain of South Carolina. Researchers tagged fourteen black bears in the fall and captured eleven bears the following summer. Of the eleven bears, three were tagged.

Standardized Test Prep

Multiple Choice

33. In a sample of 625 airline travelers, 485 collected "airline miles" toward free trips. What does the number $\frac{140}{625}$ represent?

A. the probability that a passenger collects airline miles
B. the sample proportion of the travelers who do not collect airline miles
C. the sample proportion of the travelers who collect airline miles
D. the margin of error for the sample

34. A random sample of people answered the question "Do you collect airline miles?" The margin of error for the sample was $\pm 2\%$. The sample proportion of people who answered no was $\frac{3}{10}$. How many people in the sample answered no?

F. 15 **G.** 225 **H.** 750 **I.** 2500

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35. A research group had a stack of survey responses. The number of respondents was more than 5000 and fewer than 5500. When the researchers divided the respondents into 13 equal groups, there were no extra respondents. Similarly, there were no extra respondents when they divided the responses into 7 equal groups or 11 equal groups. How many respondents were there?

A. 1001 **B.** 5005 **C.** 5031 **D.** 500,500

Short Response

36. What is the margin of error for a random sample of size 3600? Show your work.

Extended Response

37. In a poll of 2750 airline travelers, 138 said they never check their luggage when they fly. Find the sample proportion, the margin of error, and the interval likely to contain the true population proportion.

Mixed Review

Lesson 12-4 **Find the mean and the standard deviation for each data set.**

38. 0 km, 1 km, 1 km, 1 km, 2 km, 2 km, 2 km, 3 km, 3 km, 4 km, 5 km, 10 km

39. 1 oz, 1 oz, 2 oz, 2 oz, 3 oz, 4 oz, 5 oz, 6 oz, 8 oz, 9 oz, 10 oz, 10 oz, 12 oz, 20 oz

Lesson 11-4 **Use summation notation to write each arithmetic series for the specified number of terms.**

40. $3 + 8 + 13 + \ldots; n = 5$

41. $41 + 33 + 25 + \ldots; n = 8$

42. $-14 + (-8) + (-2) + \ldots; n = 6$

43. $-27 + (-21) + (-15) + \ldots; n = 10$

Lesson 10-4 **Find the equation of each ellipse centered at the origin.**

44. height: 20 units
width: 6 units

45. height: 12 units
width: 10 units

46. height: 24 units
width: 36 units

Algebra at Work

Market Researcher

When questions arise about consumer products or services, a market researcher gathers statistical information to help answer the questions. The information a market researcher collects and analyzes helps companies improve their products and make decisions about their customer base. Quantitative research allows a market researcher to analyze data from a large population of potential customers. Market research strategies for gathering information include the following.

- mail surveys
- telephone surveys
- focus groups
- in-person interviews

Take It to the NET For more information about market research, go to **www.PHSchool.com**.
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