

11.5

Making Inferences from Sample Surveys

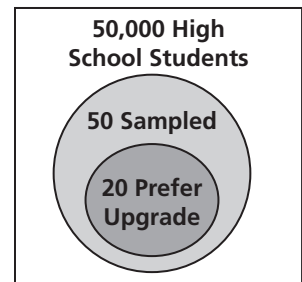
For use with Exploration 11.5

Essential Question How can you use a sample survey to infer a conclusion about a population?

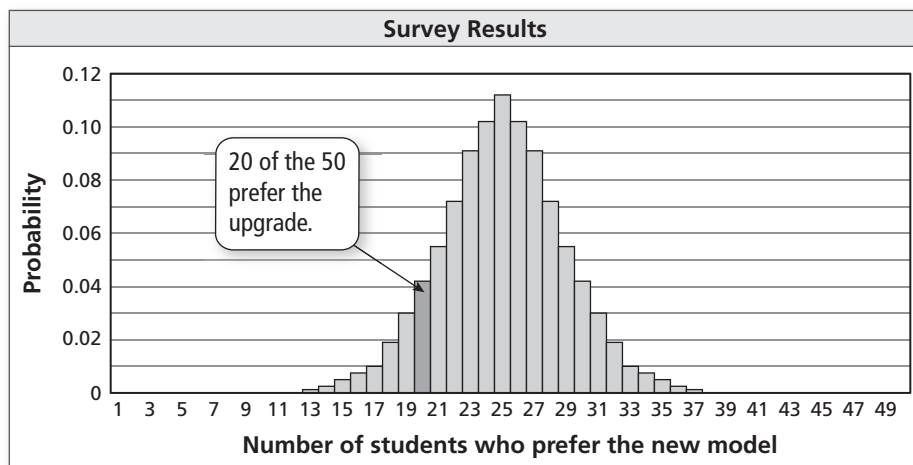
1 EXPLORATION: Making an Inference from a Sample

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. You conduct a study to determine what percent of the high school students in your city would prefer an upgraded model of their current cell phone. Based on your intuition and talking with a few acquaintances, you think that 50% of high school students would prefer an upgrade. You survey 50 randomly chosen high school students and find that 20 of them prefer an upgraded model.



- Based on your sample survey, what percent of the high school students in your city would prefer an upgraded model? Explain your reasoning.
- In spite of your sample survey, is it still possible that 50% of the high school students in your city prefer an upgraded model? Explain your reasoning.
- To investigate the likelihood that you could have selected a sample of 50 from a population in which 50% of the population does prefer an upgraded model, you create a binomial distribution as shown below. From the distribution, estimate the probability that exactly 20 students surveyed prefer an upgraded model. Is this event likely to occur? Explain your reasoning.



11.5 Making Inferences from Sample Surveys (continued)

1 EXPLORATION: Making an Inference from a Sample (continued)

- d. When making inferences from sample surveys, the sample must be random. In the situation described on the previous page, describe how you could design and conduct a survey using a random sample of 50 high school students who live in a large city.

Communicate Your Answer

2. How can you use a sample survey to infer a conclusion about a population?
3. In Exploration 1(c), what is the probability that exactly 25 students you survey prefer an upgraded model?

11.5**Notetaking with Vocabulary**

For use after Lesson 11.5

In your own words, write the meaning of each vocabulary term.

descriptive statistics

inferential statistics

margin of error

Core Concepts**Margin of Error Formula**

When a random sample of size n is taken from a large population, the margin of error is approximated by

$$\text{Margin of error} = \pm \frac{1}{\sqrt{n}}.$$

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 who would respond the same way is likely to be between $p - \frac{1}{\sqrt{n}}$ and $p + \frac{1}{\sqrt{n}}$.

Notes:

11.5 Notetaking with Vocabulary (continued)**Extra Practice**

1. The numbers of minutes spent each day on a social networking website by a random sample of people between the ages of 18 and 64 are shown in the table. Estimate the population mean μ .

Number of Minutes				
175	15	190	180	45
100	210	240	190	60
102	165	253	192	102
12	180	189	193	230
300	185	190	395	186
183	200	165	195	409

2. Use the data in Exercise 1 to answer each question.
- a. Estimate the population proportion ρ of social network users between the ages of 18 and 64 who spend more than 120 minutes each day on a social networking website.
- b. Estimate the population proportion ρ of social network users between the ages of 18 and 64 who spend fewer than 60 minutes each day on a social networking website.

11.5 Notetaking with Vocabulary (continued)

3. Two candidates, A and B, are running for the student council president position. The table shows the results from four surveys of randomly selected students in the school. The students are asked whether they will vote for candidate A. The results are shown in the table.

Sample Size	Number of Votes for Candidate A	Percent of Votes for Candidate A
10	6	60%
20	11	55%
50	20	40%
150	64	42.7%

- a. Based on the results of the first two surveys, do you think Candidate A will win the election? Explain.
- b. Based on the results in the table, do you think Candidate A will win the election? Explain.
4. A national polling company claims that 39% of Americans rate the overall quality of the environment in the nation as “good.” You survey a random sample of 50 people. What can you conclude about the accuracy of the claim that the population proportion is 0.39 when 19 Americans say the quality of the environment is good?
5. In a survey of 2680 people in the U.S., 60% said that their diet is somewhat healthy.
- a. What is the margin of error for the survey?
- b. Give an interval that is likely to contain the exact percent of all people in the U.S. who think their diet is somewhat healthy.