



UNDERSTAND

7. **Reason** Suppose a civic engineer wants to conduct a survey to find out if residents of a city would be in favor of widening one of the city's roadways for increased traffic flow.
 - a. Would a sample consisting of residents who utilize that roadway to travel to work each morning be representative? Explain.
 - b. Would a sample consisting of residents who live along that roadway be representative? Explain.
 - c. Would a random sample of homeowners in the city be representative? Explain.
8. **Make Sense and Persevere** A pharmaceutical company is developing a new oral medication for the treatment of psoriasis, a skin disease marked by red, itchy, scaly patches. Describe how you could design a controlled experiment to test the effect of the medication. How could you keep participants from knowing whether or not they were in the treatment group?
9. **Error Analysis** Describe and correct the error a student made when responding to the following question.

A website wants to post a blog about the most popular type of pet in the Seattle area. Would a sample consisting of every tenth ticket holder to the local dog show be representative? Explain.

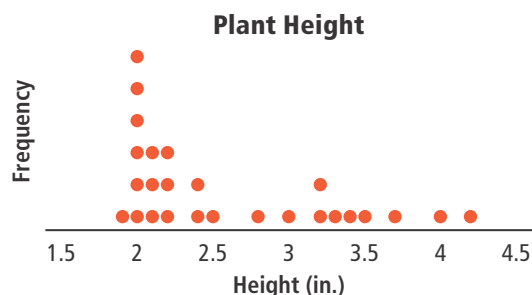
Yes; since the sample is a systematic random sample, it would be representative of the population.



10. **Higher Order Thinking** Suppose a grocery store manager wishes to survey the store's employees in order to determine whether they prefer expanding the existing break room or building an outdoor patio for the employees.
 - a. How could the manager conduct an unbiased stratified sampling?
 - b. How could the manager conduct an unbiased systematic sampling?

PRACTICE

11. **What type of study is described?** SEE EXAMPLE 1
 - a. Managers of a forest preserve want to know what percent of the visitors with dogs keep their dogs on a leash. The park assigns an employee to count the numbers of visitors that do and do not use a leash.
 - b. A local newspaper polls citizens of a city about whether they support a local tax levy.
12. A researcher wants to know the average growth of a certain plant one week after germination. The greenhouse where he grows the plants has 12 trays with 36 plants on each tray. He picks one tray from the greenhouse and measures the heights of each plant. The results are shown in the dot plot.



When analyzing the data, he sees that the heights of the plants are clustered around 2 in. Could this be the result of bias in his sampling method? Explain. SEE EXAMPLE 2

13. **What sampling method is used in the following examples? Is the method biased or not?** SEE EXAMPLE 3
 - a. A clothing manufacturing company divided its employees up by units, and then they randomly selected three employees from each unit to represent the company at a convention in Las Vegas.
 - b. Mr. Yotsey put names of all students at his school on identical slips of paper in a box and distributed surveys to the students whose names he pulled.
14. Researchers want to find out if warm water therapy increases muscle strength in people 65 years of age and older. Describe a design for a controlled study of this question. What are some potential sources of bias in your study? SEE EXAMPLE 4

APPLY

- 15. Make Sense and Persevere** Suppose a major oil company hired a survey organization to conduct a study of citizens living within 5 mi of the coast.
- The survey question is, *“Do you want to save money at the gas pump? Well then you would be in favor of off shore drilling, right?”*
- Explain the bias that exists in this scenario.
- 16. Communicate Precisely** A group of farmers wants to test a new fertilizer being produced for soybean crops. Explain how the farmers could set up the control group and the experimental group for this study.
- 17. Make Sense and Persevere** At Miami University in Oxford, OH, there is a university seal located in the heart of campus. There is a long-standing tradition that claims if you step on the seal you will fail your next exam.
- Natalie spends several hours over several different days, at varying times, counting the number of students who pass along the walkway and the number of students who step on the seal. Which of the three main types of study does Natalie use in her project?
- 18. Model With Mathematics** A commercial developer hires a market research company to determine the mean household income of those who live within a 10 mi radius of the site of a proposed upscale shopping center.
- Explain why the commercial developer would do this.
 - How might the market research company get the information?
- 19.** A newspaper hires a polling company to determine the level of support in the county for raising property taxes in order to increase funding for local schools. The polling company calls phone numbers chosen at random from a phone number registry between the hours of 5:00 P.M. and 7:00 P.M. What are some potential sources of bias in this sampling method?



ASSESSMENT PRACTICE

- 20.** Choose Yes or No to tell whether each of the following describes a convenience sampling method.

	Yes	No
A manager surveys every fourth customer about their level of satisfaction with their shopping experience.	<input type="checkbox"/>	<input type="checkbox"/>
When a school district wishes to get feedback on the district’s new webpage, they survey the entire population of randomly selected schools.	<input type="checkbox"/>	<input type="checkbox"/>
When Sheila wanted to find out what type of music was most popular among the students in her history class, she asked the two students who sat on either side of her.	<input type="checkbox"/>	<input type="checkbox"/>
The quality control officer of a ladder manufacturer walked into the shop, pulled the five closest ladders, and gave them several stress tests checking for potential defects.	<input type="checkbox"/>	<input type="checkbox"/>

- 21. SAT/ACT** A researcher studies differences in career goals between boys and girls in middle school. All of the students in the seventh grade schools in a particular county answer a list of questions. What type of study is this?
- Ⓐ experiment Ⓒ observational study
Ⓑ sample survey Ⓓ random trial

- 22. Performance Task** A grocery store surveys every fifth customer to determine whether it should consider expanding its organic foods department. The results of the 500 customers surveyed are shown in the table.

In favor of expanded organic dept.?	
Yes	378
No	97
Indifferent	25

Part A What type of sampling method was used? Does it seem valid?

Part B Based upon the results of this survey, about what percent of the store’s customers would favor the expansion?

Part C What is the statistical variable in this study? Is this a quantitative or categorical variable?