

## Section 4.4 Statistical Bias

1. A television commercial urges viewers to complete a survey on how they feel about technology. The survey is located on the company's Web site. What type(s) of bias does this represent? Explain.
2. Suggest changes to each experiment so it does not contain measurement bias.
  - a) Students took turns standing still in the middle of a room while another student measured their height with a metre stick.
  - b) To measure the time for an ice cube to melt at room temperature, a student places one on his desk and closely observes it from his chair, using a stopwatch to record the time.
3. "The current Prime Minister has an approval rating of 62%. Do you approve or disapprove of the recent actions the current Prime Minister has taken?" Rewrite the survey question so it does not contain response bias.
4. Identify the bias in each scenario.
  - a) Participants in a study were asked: "Is your financial situation this year as good as last year, or better than last year?"
  - b) The volume of water in three beakers was recorded. The recorded volumes were less than the actual volumes because the person doing the study did not measure the volume of water at eye level.
  - c) To study her peers' opinions about the importance of exercise, Ivana surveyed only members of her school's jogging club.
  - d) A student handed out a survey that asked "Do you enjoy watching professional hockey?" Response rates were significantly higher for males than females.
5. Identify the cause(s) of non-response bias in each situation. What could be done in each situation to reduce the bias?
  - a) Researchers posted a sign on a highway that read "Voluntary Traffic Survey Ahead." Only about 2% of passing drivers stopped to participate in the survey.
  - b) In June, students at a high school were given a survey that asked: "Which, if any, school events did you attend this year and would like to see return next year?" The students were asked to complete the survey and return it the next day. There was a lower response rate from the grade 12s than other grades.
6. Which situations contain sampling bias? How can the bias be corrected?
  - a) Commuters at various bus stops around the city are asked to complete a survey on their opinions of public transit.
  - b) A national survey was conducted. 200 000 surveys were mailed to homes randomly selected from each province and territory, in proportion to the population of each province or territory.
7. Which is a better way of asking the question? Explain.
  - A "Do you believe that the rate of deforestation in Canada is acceptable or unacceptable at the present time, or are you undecided?"
  - B "In Canada, approximately 56 000 ha of forest are deforested every year. Do you believe that more should be done to protect Canada's forests?"

