2.2 Sampling Principles

Specific Expectations

Using Data Management to Investigate Relationships
RE1.03 design and carry out an investigation or experiment involving relationships between two variables, including the collection and organization of data, using appropriate methods, equipment, and/or technology (e.g., surveying; using measuring tools, scientific probes, the Internet) and techniques (e.g., making tables, drawing graphs);

Understanding Characteristics of Linear Relations
RE2.01 construct tables of values, graphs, and equations, using a variety of tools (e.g., graphing calculators, spreadsheets, graphing software, paper and pencil), to represent linear relations derived from descriptions of realistic situations.

Link to Get Ready

The Get Ready segment Rates provides the needed skills for this section. You may wish to have students complete or review Get Ready questions 5 and 6 before starting this section.

Teaching Suggestions

• Have students read the introductory paragraph about the phone-in radio show. As a class, discuss the inaccuracies of this type of survey.
• Assign the Investigate activity. This activity would work well in groups of three students. (5 min)
• After the students discuss the Investigate questions in their groups, define the terms, **population**, **sample**, and **census**, and have a whole class discussion on how to collect a sample to properly represent a population. Stress that the various types of random sampling are not necessarily appropriate in a given situation. For example, **stratified random sampling** is only necessary when it is important to have various groups represented proportionally, such as when polling students in a school. It may be important to stratify them by grade. **Systematic random sampling** is an easy way of selecting large samples from an organized list of names. (15 min)
• Discuss the term **bias** as it applies to statistics. Suggest that it represents the possibility, not a guarantee, of inaccurate results.
• Review the vocabulary before assigning Communicate Your Understanding. Allot 15 minutes for students to complete C1, C2, and Practise questions 1, 2a), and 2b).
• Discuss the answers to Communicate Your Understanding as a class before assigning additional exercises.
• You may wish to use **BLM 2.2.1 Practice: Sampling Principles** for remediation or extra practice.

Investigate Answers (page 48)

1. **b)** is going to give the best results because the students are randomly selected from across the country.

2. Answers will vary.

Communicate Your Understanding Responses (page 52)

C1. No. The sample size is small and they all live in the same neighbourhood. There is non-random sampling and they don't represent the entire population.

C2. a) Answers may vary. Simple random sample: assign each student a number and randomly select 100 of those numbers using a computer or graphing calculator. Systematic random sample: put all names in alphabetical order. Randomly choose one student as the starting point, then, survey every 5th person before and after the starting point.

b) Answers will vary. Possible answer: Surveying my five best friends.

Practise

Remind students that a population represents the list of objects being studied and need not necessarily be people. They may need some hints to be able to answer question 2. In question 4a) and c), students may think there is bias where there is none.

Connect and Apply

In question 5, students may be uncomfortable with some stratification ideas, such as race or culture. This would be a good opportunity to discuss how governments and school boards may wish to use this type of stratification to see whether all groups are being served appropriately. Question 11 involves the use of a graphing calculator. It is an important tool for generating random numbers. Software, such as *Fathom*™, or a spreadsheet also could be used. You may wish to use **BLM T6 *Fathom*™**. Questions 13 and 14 are important in understanding bias in statistical studies.

Extend

Questions 17 and 19 are a good follow up to questions 13 and 14 in the discussion on bias. Question 18 provides an excellent opportunity for students to analyse a situation.

Literacy Connections

By now, students will probably have developed opinions on the use of statistical information. Assign the following activity:

Write an opinion piece, a series of paragraphs expressing your opinion, on one of the topics below. Develop your main idea with supporting details. Be sure to write your opinion piece with your audience in mind, an adult who is interested in your opinion.

Topics:
a) A census is the best way to collect data.
b) You will never have bias in a survey when you use random sampling.

Review students' opinion pieces and ensure that students have included three paragraphs: an introduction, the body, and a conclusion. Their opinion should be clearly stated and students should provide details with reasons, examples, and facts to support their opinions. You may wish to use **BLM A21 Opinion Piece Checklist** to assess the students. You may also wish

to provide an opportunity for students to present their opinion pieces to the class. Use **BLM A4 Presentation Checklist** to assess students' presentations.

Exercise Guide

Category	Question Number
Minimum (essential questions for all students to cover the expectations)	1–4, 6–9, 11, 12
Typical	1–9, 11–14, 15 or 16
Extension	17–20