3.1 Sampling Techniques

Student Text Pages
102–109

Suggested Timing
80–160 min

Tools
- graphing calculators

Optional
- software application with random number generator

Related Resources
BLM 3-3 Section 3.1 Sampling Techniques
BLM 3-4 Section 3.1 Achievement Check Rubric

Link to Prerequisite Skills

Students do not need to complete any questions in the Prerequisite Skills prior to starting this section.

Warm-Up

1. Why it is not always possible to survey an entire population?
2. Why is it important to select people from a group who represent the opinions of the group when surveying only some people in the entire group?
3. Suzanne decided to survey 20 people in the school cafeteria. She did not like the answer three students gave, so she erased their responses and asked three more students for their opinions. Was this fair? Explain.

Warm-Up Answers

1. Surveying the whole population can be expensive and time consuming.
2. You must talk to people who are a true representation of the group for your findings to apply to the entire group.
3. Maybe. Their answers should not be removed because Suzanne does not agree with them. But she might remove their answers if they did not take the survey seriously and gave false opinions.

Teaching Suggestions

- This is a language intensive section, and as such it is important that students take the time needed to fully express their thoughts in a full solution.

Warm-Up

- Write the Warm-Up questions on the board or on an overhead. Have students complete the questions independently. Then, discuss the solutions as a class.

Section Opener

- Read the introduction aloud. As a class, discuss how a sample of the people in the photograph might be chosen.

Investigate

- Go through the Investigate yourself before using the technology in the class to be sure you understand each part of the activity.
- If graphing calculators or software applications are not available, an alternative activity would be to discuss how to randomly generate a sample from a population without using technology. Suggestions might include placing names of students from each grade on lottery or bingo-style balls and rolling out the required numbers for each grade or choosing every *n*th student from each homeroom class or full grade list.
- Spend time discussing **question 4**.

Investigate Answers (page 102–103)

1. Grade 10: 26.7%; grade 11: 25%; grade 12: 15%

2. Grade 10: 26.7%; grade 11: 25%; grade 12: 15%

The percent of students from each grade in the group Mrs. Barron selected is the same as the percent of mathematics students in each grade.

4. Her sample might not be proportional to number of students in each grade.

Examples

- Discuss the different ways to sample a population and how bias can affect a survey.
- Have students work through the Examples as a class before proceeding to the Discuss the Concepts.

Key Concepts

- Ensure students understand the Key Concepts.

Discuss the Concepts

- You can use chart paper to brainstorm ideas for each question, and then allow some time for students to put these ideas together in a full solution.

Discuss the Concepts Suggested Answers (page 106)

D1. Letasha used convenience sampling. It is a simple way of collecting data.

D2. Voluntary-response sampling and convenience sampling are most likely to introduce bias, since the data set is relatively small, and the results might not represent the opinions of the whole population.

D3.

Sampling Technique	Advantage	Disadvantage
Simple Random	Not biased.	May be more difficult to do.
Stratified Random	All parts of the population are equally sampled.	Maybe be more difficult or expensive to carry out.
Voluntary Response	Easy to do.	Biased.
Cluster	May be less costly.	May be biased.
Convenience	Easy to do.	Biased.
Systematic	Easy to carry out.	Biased.

Practise (A)

- Encourage students to review the Investigate and the Examples before asking for assistance.
- This section is language heavy. Allow students to read their responses and discuss how some of the answers could be expanded on to bring out the full intent of the solution.

Apply (B)

- Emphasize the importance of fully expressing the ideas in these questions.
- **Question 5, part b)** is a Literacy Connect. You may wish to assign this question as a journal entry or to discuss the question as a class. Literacy Connect questions offer the opportunity to explore literacy issues in the mathematics classroom and within the context of mathematics.

Accommodations

Memory—provide graphic organizers for information about sample types

Perceptual—provide an organizational chart with different colours for each sample type

Gifted and Enrichment—have students use ESTAT to learn abut the kind of information gathered through Census Canada

Language—use a familiar context and describe the make-up of a sample done with each sampling method

Motor—allow verbal responses to questions that require explanations

- **Question 7** links to the Chapter Problem. Remind students to keep the solution to this question handy as the methods they used may help them with the Chapter Problem Wrap-Up. Record students' ideas on chart paper or use Think-Pair-Share.
- **Question 10** is an Achievement Check question. It could be used as a second Investigate by splitting the class into 4 groups and assigning each group one of the four sampling techniques. They could present their solutions to the class and debate which technique is best. You may wish to use **BLM 3-4 Section 3.1 Achievement Check Rubric** to assist you in assessing your students.

Extend (C)

- Assign the Extend questions to students who are not being challenged by the questions in Apply.
- Have students work on **questions 11 and 12** individually, and then compare answers with a peer.
- **Question 12** involves some quantitative analysis, and should reinforce that when selecting a sample, the number sampled is as important as the type of sampling used.

Achievement Check Answers (page 109)

10. a) i) Use a random number generator to chose your sample from a list of all students in the school.

ii) Survey all the students in one class.

iii) From a list of students in each grade, make a sample that is proportionate for each grade compared to the entire school.

iv) Survey all the students in one area of the school, such as the cafeteria.

b) Cluster or convenience sampling is the easiest; random sampling is the fairest; stratified sampling would be best if musical tastes vary greatly between grades.

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	n/a
Reasoning and Proving	2–12
Reflecting	2–12
Selecting Tools and Computational Strategies	12
Connecting	5
Representing	11
Communicating	1–3, 5–12

Ongoing Assessment

- While students are working, circulate and see how well each person works. This may be an opportunity to continue observing and recording individual students' learning skills.

Extra Practice

- You may wish to use **BLM 3-3 Section 3.1 Sampling Techniques** for remediation or extra practice.