2.1 Hypotheses and Sources of Data

Strand:
Linear Relations

Student Text Pages
42 to 47

Suggested Timing
80 min

Related Resources
BLM 2.1.1 Practice: Hypotheses and Sources of Data
BLM 2.1.2 Achievement Check Rubric
BLM A9 Communication General Scoring Rubric

Mathematical Process Expectations Emphasis

- ☐ Problem Solving
- ☑ Reasoning and Proving
- ☑ Reflecting
- ☐ Selecting Tools and Computational Strategies
- ☐ Connecting
- ☐ Representing
- ☑ Communicating

Specific Expectations

Using Data Management to Investigate Relationships

RE1.02 pose problems, identify variables, and formulate hypotheses associated with relationships between two variables;

RE1.04 describe trends and relationships observed in data, make inferences from data, compare the inferences with hypotheses about the data, and explain any differences between the inferences and the hypotheses (e.g., describe the trend observed in the data. Does a relationship seem to exist? Of what sort? Is the outcome consistent with your hypothesis? Identify and explain any outlying pieces of data. Suggest a formula that relates the variables. How might you vary this experiment to examine other relationships?);

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.

Warm-Up

Have students state their opinions on topics, such as:

- Who is the richest person in the world?
- Can you throw a ball farther on Earth or on the moon?
- How are your marks affected by the amount of time you study for a test?

Discuss how their answers to these questions are all hypotheses and that they can be tested and proven to be true or false.

Teaching Suggestions

- Begin with the Warm-Up. (5 min)
- Have students complete the Investigate. (10 min)
- Conduct a class discussion on the results. (5 min)
- As a class, take up Examples 1 and 2, or give similar examples. In Example 2, discuss that the use of data is what makes it primary or secondary. Statistics Canada may have posted original data, making it primary data. If, for example, a student uses the data in a study, it then becomes secondary data. (15 min)
- Assign Practise questions 1 to 4 and take up in class. (15 min)
- Review the key concepts, primary, and secondary data before proceeding to the rest of the exercises.
- You may wish to use **BLM 2.1.1 Practice: Hypotheses and Sources of Data** for remediation or extra practice.

Common Errors

- Some students may write numeric hypotheses with exact values, such as "most students use the telephone for 2 h per day."

R_x Have students consider ranges of values, such as "between 2 h and 4 h," or "at least 1 h."

Ongoing Assessment

Use Achievement Check question 11 to monitor student success. See the Achievement Check Answers and **BLM 2.1.2 Achievement Check Rubric** to assist you in assessing your students.

Communicate Your Understanding questions can be used as quizzes to assess student Communication skills (see **BLM 2.1.2 Achievement Check Rubric** for levels).

You may wish to use **BLM A9 Communication General Scoring Rubric** to assist you in assessing your students.

Accommodations

Gifted and Enrichment—Challenge students to make hypotheses and collect primary or secondary data to prove if the hypotheses are true.

Visual—Let students work with a reading buddy in order to have the information and the questions in this section read to them.

Perceptual—Let students work with an educational assistant, if possible, who can help to explain what is being asked in the questions in this section.

Language—Give students photocopies of the notes for this section and encourage them to highlight the key ideas.

ESL—Allow students extra time in class to understand the meaning of the words in this section. Encourage students to use a translator to ensure that they understand the meaning of the words being used and the context.

Investigate Answers (page 42)

1. Answers will vary.

a) Fifteen percent of students at my school will get their driver's license this year.

b) Television advertising is more effective than newspaper advertising.

c) People consider price more important when buying toothpaste.

d) Girls prefer studying with music playing while boys prefer studying in a quiet room.

e) People rarely use a phone book more than five times a year.

f) Teenagers like tennis the most.

2. Not all hypotheses use numbers. Answers will vary. There are hypotheses that pose a question used to guide research; some hypotheses are just statements presenting a certain viewpoint; while other hypotheses state statistics.

3. Answers will vary.

a) The total number of students in the school and the number that will get their driver's license this year.

b) The statistics for television and newspaper advertising.

c) The statistics from different toothpaste companies to see if price or brand name affected sales more.

d) You will need to find out what different study habits boys and girls prefer.

e) Find the average number of times a person will use a phone book.

f) Find the preferred sport among teenagers.

Communicate Your Understanding Responses (page 44)

C1. Answers will vary.

a) Any multiple of 2 is always an even number.

b) Candy is more popular than gum.

c) Prove the first hypothesis using algebra and conduct a survey to test the second hypothesis.

C2. No. Secondary data may be more reliable.

Practise

In questions 1 and 2, caution students that the opposite hypothesis is not always as simple as adding the word "not." For example, the opposite of "less than" is "greater than or equal to."

Connect and Apply

Students may have some difficulties with questions 5b) and 6c). Although they may not understand random sampling, these questions allow students to consider methods of sampling a population. Question 8 refers to the Chapter Problem and can be used as an ongoing assessment tool. You may wish to assign this problem, but not take up the answers in class. Questions 9 and 10 introduce the Internet as a research tool and should be assigned in preparation for further Internet use. Question 11 is a good opportunity to analyse and reflect on hypotheses and makes a good formative assessment piece. Use **BLM 2.1.2 Achievement Check Rubric** to assist you in assessing your students.

Achievement Check Answers (page 47)

11. a) No. Most participants caught at least one fish (35 out of the 55 entrants), rather than no fish at all as Heather predicted.

b) No. Most people either caught nothing or caught more than two fish (31 out of the 55 entrants).

c) Heather: Most entrants would catch at least one fish.
George: Most entrants would catch nothing or more than two fish.

d) Yes. Two explanations are possible: Both George and Heather's hypotheses are false, so the opposite of these hypotheses must be true. Alternatively, by looking at the data, you can show that 35 out of 55 entrants caught one or more fish, and 31 entrants caught no fish or more than two fish, so both hypotheses in part c) are true.

e) The data from the local newspaper are secondary since they were collected by someone other than George.

f) Several correct answers are possible for each prediction.
Two of the simplest are
- Heather predicts that most entrants will catch fewer than two fish.
- George predicts that most entrants will catch from one to three fish.

Note that the question asks for *new* hypotheses, so, the answers should not be the same as the opposite hypotheses given in part c).

Extend

Questions 12 and 13 are interesting extensions, and students may notice that in question 12, the relationship is linear, but in question 13 it is not. Set aside some class time for a discussion about non-linear relationships.

Exercise Guide

Category	Question Number
Minimum (essential questions for all students to cover the expectations)	1–6
Typical	1–11
Extension	12–14