# 3.1 Two-Variable Data Sets

**Student Text Pages**
142–151

**Suggested Timing**
80 min

**Tools**
- graphing calculators

**Related Resources**
BLM 3-3 Section 3.1 Two-Variable Data Sets

## Link to Prerequisite Skills

Students should complete Interpret Graphs and Use Technology in the Prerequisite Skills before proceeding with this section.

### Warm-Up

**1.** Is each scenario one-variable data or two-variable data?
- **a)** The colour preference for a group of students and the frequency of each preferred colour.
- **b)** The distance versus time data for a car travelling at 100 km/h down the highway.

**Warm-Up Answers**

**1. a)** one-variable data **b)** two-variable data

## Teaching Suggestions

### Warm-Up

- Display the Warm-Up question. Have students complete the question independently. Then, discuss the solutions as a class.

### Section Opener

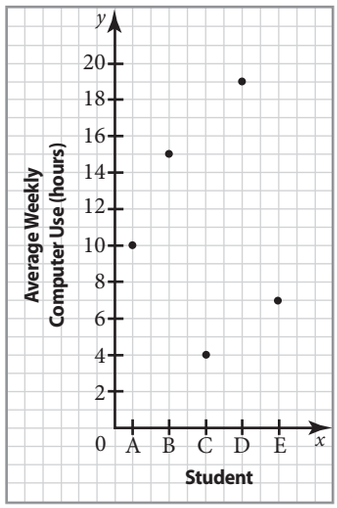
- Discuss the opening paragraph as it applies to variables. Relate the concept of a variable in algebra to that of an input quantity that might cause a specific effect in statistics.

### Investigate

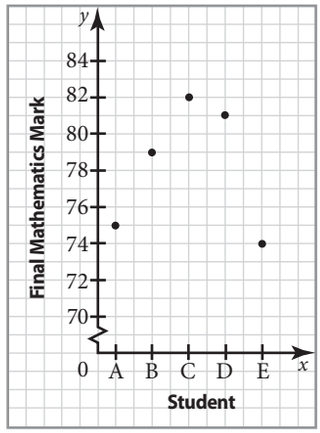
- You could use this similar situation as an alternate Investigate.

**1.** At the beginning of grade 11, five students' computer use was tracked and their final mathematics marks were recorded. How many facts do you know about each student?

**a)** **Students' Average Weekly Computer Use**




**b)** **Students' Final Mathematics Marks**



**Investigate Answers (pages 142–143)**

**1. a)** The number of televisions in a specific household.

**b)** The number of households surveyed and the number of televisions in each household. One fact is known about each household: the number of televisions. That is what each dot represents.

**2. a)** The number of households containing a specific number of televisions.

**b)** The number of households with a specific number of televisions. One fact is known: the number of televisions owned by each household.

**3. a)** One household.

**b)** The number of telephones and number of televisions for five specific households. Two facts are known about each household: the number of televisions owned and the number of telephones owned.

**4. a)** number of televisions

**b)** number of televisions

**c)** number of telephones, number of televisions

**d)** A scatter plot can be used to display data when there are at least two variables in the data set.

**5. a)** If only one axis of the graph represents a variable, then the data is one-variable data. For example, the number of televisions is the variable, so the data in the dot plot is one-variable data. If both axes represent a variable then the data is two-variable data. For example, the number of televisions and the number of telephones are both variables, so the data in the scatter plot is two-variable data.

**b)** For one-variable data, use a dot plot, a bar graph, or a histogram because the *y*-axis in each of these graphs is the variable and the *x*-axis represents each item being measured or counted. For two-variable data, use a scatter plot because each axis represents one of the variables.

## Examples

- Examples 1 and 2 illustrate the difference between one- and two-variable statistics. Remind students that a tally, or frequency, is not a variable.

## Key Concepts

- Review the Key Concepts as a class. Have them record the concept in their notebooks and include an example beside each entry.

## Discuss the Concepts

- Ask students to think about their responses to these questions. Have them discuss their responses with a classmate, and then discuss as a class.

**Discuss the Concepts Suggested Answers (page 146)**

**D1.** Two-variable data analysis. Each subject is an office and has two attributes: the monthly photocopier use and the office budget. A scatter plot would be appropriate to display the data.

**D2.** One-variable data analysis. Each subject is a restaurant and the attribute is the number of violations. A dot plot or a bar graph would be appropriate to display the data.

**D3.** One-variable data analysis. Each subject is a number from 2 to 12 (the sum of two dice) and the attribute is the frequency of each sum being rolled. A dot plot or a bar graph would be appropriate to display the data.

**D4.** Two-variable data analysis. Each subject is an individual Canadian and has two attributes: the percent of income spent on housing and annual income. A scatter plot would be appropriate to display the data.

## Common Errors

- Some students may consider frequency to be a variable. Some students may try to interchange bar graphs with scatter plots.

$R_x$ Have students review the Investigate and ask how many things they know about each household.

## Accommodations

**Language**—add definitions for variable and categorical variable to the Word Wall

**Perceptual**—after completing the **Investigate**, use Concept Attainment to differentiate between one-variable and two-variable data sets. Provide examples on index cards, and have groups sort the cards into piles labelled *one-variable data* and *two-variable data*.

**Memory**—have one group attach their index cards from the Concept Attainment activity to a poster with the columns labelled *one-variable* data and *two-variable data* for class reference

**Visual**—use an LCD projector to review the steps for entering data and constructing scatter plots on graphing calculators or other technology. Have the class create their own handout with these steps for future reference.

**Motor**—allow graphing calculators or other technology for constructing graphs. Provide a partner for reading and entering data.

**Gifted and Enrichment**—have students research the features of a box-and-whisker plot, then present their research and solution to **question 10** to the class

**ESL**— provide a partner to assist students with reading and understanding this section. Ask students to record unfamiliar words and terms in their personal math dictionaries. Encourage students to use diagrams, symbols, their first language, or other means of recording and understanding the meaning of the unfamiliar word. Pair them with a classmate who can help them understand the meaning of the new terms: one-variable data set, two-variable data set, attribute, variable, dot plot, scatter plot, and categorical variable.

## Practise (A)

- You may wish to have students work in pairs or small groups to complete the Practise questions.
- Encourage students to refer to the Examples before asking for assistance.
- Consider using a think-pair-share format for these questions.
- For **question 4**, have students use the Internet to investigate systolic and diastolic blood pressure.

## Apply (B)

- Consider using a journal entry for **question 5.**

## Extend (C)

- Assign the Extend questions to students who are not being challenged by the Apply questions.

## Literacy Connect

- Have one or two students read the section opener out loud.
- Throughout the lesson, point out how to distinguish between one-variable and two-variable data sets.
- Discuss the meaning of systolic and diastolic blood pressure as related to **question 4** in the **Literacy Connect** on page 148.
- Discuss the meaning of new terms in this section: *one-variable data set*, *two-variable data set*, *attribute*, *variable*, *dot plot*, *scatter plot*, and *categorical variable*. Encourage students to add these definitions to their personal math dictionaries.

## Mathematical Process Expectations

| Process Expectation | Questions |
|---|---|
| Problem Solving | 5, 8, 9 |
| Reasoning and Proving | 2, 3, 5–10 |
| Reflecting | 7, 10 |
| Selecting Tools and Computational Strategies | 4, 6, 8 |
| Connecting | 4, 5, 7–9 |
| Representing | 3, 4, 6, 8, 9 |
| Communicating | 2–10 |

## Ongoing Assessment

- Most of the Discuss the Concepts questions can be used as short quizzes to determine if students have understood the Investigate and Examples.

## Extra Practice

- Use **BLM 3-3 Section 3.1 Two-Variable Data Sets** for extra practice or remediation.