# Linear Relations and Functions

# 6

## General Outcome

Develop algebraic and graphical reasoning through the study of relations.

## Specific Outcomes

**RF1** Interpret and explain the relationships among data, graphs and situations.

**RF2** Demonstrate an understanding of relations and functions.

**RF3** Demonstrate an understanding of slope with respect to:
- rise and run
- line segments and lines
- rate of change
- parallel lines
- perpendicular lines.

**RF4** Describe and represent linear relations, using:
- words
- ordered pairs
- tables of values
- graphs
- equations.

**RF8** Represent a linear function, using function notation.

By the end of this chapter, students will be able to

| Section | Understanding Concepts, Skills, and Processes |
|---|---|
| 6.1 | ✓ describe a possible situation for a graph |
| | ✓ sketch a graph for a given situation |
| 6.2 | ✓ determine if a relation is linear |
| | ✓ represent linear relations in a variety of ways |
| | ✓ explain why data points should or should not be connected |
| | ✓ identify the dependent and independent variables in a relation |
| 6.3 | ✓ understand the meaning of domain and range |
| | ✓ express domain and range in a variety of ways |
| 6.4 | ✓ sort relations into functions and non-functions |
| | ✓ use notation specifically designed for functions |
| | ✓ graph linear functions |
| 6.5 | ✓ determine the slope of a line |
| | ✓ use slope to draw lines |
| | ✓ understand slope as a rate of change |
| | ✓ solve problems involving slope |



| Assessment | Supporting Learning |
|---|---|
| **Assessment *as* Learning** | |
| Use the Before column of **BLM 6–1 Chapter 6 Self-Assessment** to provide students with the big picture for this chapter and help them identify what they already know, understand, and can do. You may wish to have students keep this master in their math portfolio and refer back to it during the chapter. | • During work on the chapter, have students keep track of what they need to work on in the What I Need to Work On section of their Foldable. They can check off each item as they develop the skill or process at an appropriate level. |
| **Assessment *for* Learning** | |
| **Method 1:** Use the introduction on page 266 in *Mathematics 10* to activate student prior knowledge about the skills and processes that will be covered in this chapter.<br>**Method 2:** Have students develop a journal entry to explain what they personally know about linear relations. You might provide the following prompts:<br>• How might linear relations apply to real life?<br>• What are some examples of linear relations?<br>• What are some ways you can represent linear relations?<br>• How do you show a linear relation graphically? | • Have students use the What I Need to Work On section of their Foldable to keep track of the skills and processes that need attention. They can check off each item as they develop the skill or process at an appropriate level.<br>• Students who require activation of prerequisite skills may wish to complete **BLM 6–2 Chapter 6 Prerequisite Skills**. This material is on the Teacher CD of this Teacher's Resource and mounted on the www.mhrmath10.ca book site. |
| **Assessment *as* Learning** | |
| **Chapter 6 Foldable**<br>As students work on each section in Chapter 6, have them keep track of any problems they are having in the What I Need to Work On section of their Foldable. | • As students complete each section, have them review the list of items they need to work on and check off any that have been handled.<br>• Encourage students to write definitions for the Key Terms in their own words, including reminder tips that may be helpful for review throughout the chapter.<br>• Encourage students to write examples of their own into their notebooks or math portfolios. They should have at least one example for each method that is covered in the chapter. |
| **Assessment *for* Learning** | |
| **BLM 6–3 Chapter 6 Warm-Up**<br>This reproducible master includes a warm-up to be used at the beginning of each section. Each warm-up provides a review of prerequisite skills needed for the section. | • As students complete questions, note which skills they are retaining and which ones may need additional reinforcement.<br>• Use the warm-up to provide additional opportunities for students to demonstrate their understanding of the chapter material.<br>• Have students share their strategies for completing math calculations. |

# Chapter 6 Planning Chart

| Section/ Suggested Timing | Prerequisite Skills | Materials/Technology | Teacher's Resource Blackline Masters | Exercise Guide | Assessment | | |
|---|---|---|---|---|---|---|---|
| | | | | | Assessment *as* Learning | Assessment *for* Learning | Assessment *of* Learning |
| **Chapter Opener**<br>• 30–40 min<br>(TR page 211) | | | BLM 6–1 Chapter 6 Self-Assessment<br>BLM 6–2 Chapter 6 Prerequisite Skills<br>BLM 6–4 Chapter 6 Unit 3 Project<br>BLM U3–1 Unit 3 Project<br>BLM U3–2 Unit 3 Project Checklist | | TR page 210<br>Chapter 6 Foldable, TR page 210 | TR page 210 | |
| **6.1 Graphs of Relations**<br>• 100–120 min<br>(TR page 213) | Students should be familiar with<br>• reading information from a graph<br>• the relationship between speed, distance, and time<br>• describing the relationship between the variables of a graph | • ruler<br>• grid paper<br>• CBL interface with a motion detector<br>• computer or graphing calculator with appropriate software | BLM 6–3 Chapter 6 Warm-Up<br>BLM 6–5 Section 6.1 Extra Practice | **Essential:** #1–3, 6, 8, 15–17<br>**Typical:** #1–3, 5, 8–10<br>**Extension/Enrichment:** #3, 4, 11–15, 17 | TR pages 215, 220<br>Chapter 6 Foldable, TR page 210 | TR pages 217, 218, 220 | |
| **6.2 Linear Relations**<br>• 100–120 min<br>(TR page 221) | Students should be familiar with<br>• creating a table of values<br>• plotting points and ordered pairs<br>• graphing linear relations<br>• describing patterns in a graph<br>• writing linear relations<br>• interpolation and extrapolation<br>• substituting values into an equation<br>• determining the degree of a polynomial | • measuring tape<br>• ruler<br>• grid paper or graphing technology | BLM 6–3 Chapter 6 Warm-Up<br>BLM 6–6 Section 6.2 Extra Practice | **Essential:** #1–3, 5–8, 13<br>**Typical:** #1–3, 5, 7, 9, 13, 14<br>**Extension/Enrichment:** #4, 10–14 | TR pages 223, 227<br>Chapter 6 Foldable, TR page 210 | TR pages 225, 227 | |
| **6.3 Domain and Range**<br>• 120–180 min<br>(TR page 228) | Students should be familiar with<br>• identifying independent and dependent variables<br>• describing the relationship between variables<br>• analysing and interpreting information from a graph<br>• describing a pattern<br>• working with number lines<br>• using technology to create a graph | • ruler<br>• graphing calculator or spreadsheet software<br>• grid paper | BLM 6–3 Chapter 6 Warm-Up<br>BLM 6–7 Section 6.3 Extra Practice<br>TM 6–1 How to Do Page 300 Example 4 Using TI-83/84<br>TM 6–2 How to Do Page 300 Example 4 Using Microsoft® Excel | **Essential:** #1–4, 6–8, 12<br>**Typical:** #1–6, 7 or 8, 12, 13<br>**Extension/Enrichment:** #8–13 | TR pages 230, 234<br>Chapter 6 Foldable, TR page 210 | TR pages 233, 234 | |
| **6.4 Functions**<br>• 180–240 min<br>(TR page 235) | Students should be familiar with<br>• reading information from a graph<br>• substituting values into an equation<br>• solving linear equations<br>• adding, subtracting, and multiplying polynomials<br>• interpolation and extrapolation | • grid paper<br>• ruler | BLM 6–3 Chapter 6 Warm-Up<br>BLM 6–4 Chapter 6 Unit 3 Project<br>BLM 6–8 Section 6.4 Extra Practice | **Essential:** #1–4, 6–8, 9, 16, 17<br>**Typical:** #1–7, 9, 10, 16, 17<br>**Extension/Enrichment:** #9, 11–15, 18 | TR pages 236, 241<br>Chapter 6 Foldable, TR page 210 | TR pages 238, 241 | |
| **6.5 Slope**<br>• 180–240 min<br>(TR page 242) | Students should be familiar with<br>• ratios<br>• solving proportions<br>• equivalent fractions<br>• operations with integers<br>• dividing zero by an integer and dividing an integer by zero<br>• plotting points and ordered pairs<br>• the relationship between speed, distance, and time | • grid paper<br>• plastic transparent ruler<br>• toothpick<br>• tape<br>• ruler<br>• one or more small boxes | BLM 6–3 Chapter 6 Warm-Up<br>BLM 6–9 Section 6.5 Extra Practice | **Essential:** #1, 2, 3a)–d), 4, 5, 7, 8, 17, 19<br>**Typical:** #1–5, two of 8–12, 17–19<br>**Extension/Enrichment:** #9, 13–19 | TR pages 243, 249<br>Chapter 6 Foldable, TR page 210 | TR pages 246, 247, 249 | |
| **Chapter 6 Review**<br>• 60–90 min<br>(TR page 250) | | • grid paper<br>• ruler<br>• graphing calculator | BLM 6–5 Section 6.1 Extra Practice<br>BLM 6–6 Section 6.2 Extra Practice<br>BLM 6–7 Section 6.3 Extra Practice<br>BLM 6–8 Section 6.4 Extra Practice<br>BLM 6–9 Section 6.5 Extra Practice | Have students do at least one question related to any concept, skill, or process that has been giving them trouble. | Chapter 6 Foldable, TR page 210 | TR page 250 | |
| **Chapter 6 Practice Test**<br>• 50–60 min<br>(TR page 251) | | • grid paper<br>• ruler<br>• graphing calculator | BLM 6–10 Chapter 6 Test<br>BLM 6–11 Chapter 6 BLM Answers | Provide students with the number of questions they can comfortably do in one class. Choose at least one question for each concept, skill, or process.<br>**Minimum:** #1–8, 10 | TR page 252 | | TR page 252<br>BLM 6–10 Chapter 6 Test |