Linear Equations and Graphs

7

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.

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

RF5 Determine the characteristics of the graphs of linear relations, including the:
- intercepts
- slope
- domain
- range.

RF6 Relate linear relations expressed in:
- slope–intercept form ($y = mx + b$)
- general form ($Ax + By + C = 0$)
- slope–point form ($y - y_1 = m(x - x_1)$)

to their graphs.

RF7 Determine the equation of a linear relation, given:
- a graph
- a point and the slope
- two points
- a point and the equation of a parallel or perpendicular line

to solve problems.

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

Section	Understanding Concepts, Skills, and Processes
7.1	✓ identify the slope and *y*-intercept of a straight-line graph
	✓ determine a linear equation using slope and *y*-intercept
	✓ rewrite a linear relation in slope-intercept form
	✓ graph equations in slope-intercept form
	✓ solve problems using equations in slope-intercept form
7.2	✓ convert a linear equation to general form
	✓ use intercepts to graph a line
	✓ relate the intercepts of a graph to the situation
	✓ solve problems using equations in general form
7.3	✓ write the equation of a line from its slope and a point on the line
	✓ convert equations among the various forms
	✓ write the equation of a line from two points on the line
	✓ solve problems involving equations in slope-point form
7.4	✓ identify whether two lines are parallel, perpendicular, or neither
	✓ write the equation of a line using the coordinates of a point on the line and the equation of a parallel or perpendicular line
	✓ solve problems involving parallel and perpendicular lines

Assessment	Supporting Learning
Assessment *as* Learning	
Use the Before column of **BLM 7–1 Chapter 7 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 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 338 in *Mathematics 10* to activate students' prior knowledge about the skills and processes that will be covered in this chapter. **Method 2:** Have students develop a journal entry to explain what they personally know about linear relations. You might provide the following prompts: • Where have you encountered a graph of a linear relation? • What were the variables involved in the graph? • Did you know the equation of the graph? How could you determine it? • When might you have seen two lines graphed together? What story could you make up about the graph?	• 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. • Students who require activation of prerequisite skills may wish to complete **BLM 7–2 Chapter 7 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 7 Foldable As students work on each section in Chapter 7, 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. • 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.
Assessment *for* Learning	
BLM 7–3 Chapter 7 Warm-Up 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. • Use the warm-up to provide additional opportunities for students to demonstrate their understanding of the chapter material. • Have students share their strategies for completing mathematics calculations.

Chapter 7 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 • 30–40 min (TR page 257)			BLM 7–1 Chapter 7 Self-Assessment BLM 7–2 Chapter 7 Prerequisite Skills BLM 7–4 Chapter 7 Unit 3 Project BLM U3–2 Unit 3 Project Checklist		TR page 256 Chapter 7 Foldable, TR page 256	TR page 256	
7.1 Slope-Intercept Form • 100–140 min (TR page 259)	Students should be familiar with • plotting ordered pairs • independent and dependent variables • drawing a line graph • slope and *y*-intercept • algebraic modelling • isolating a variable • integer operations • evaluating expressions	• two metre sticks • elastic band • foam cup • paper clips, string, or tape • toothpick or straightened paper clip • six identical marbles or other items of equal mass • ruler • grid paper or graphing technology	BLM 7–3 Chapter 7 Warm-Up BLM 7–4 Chapter 7 Unit 3 Project BLM 7–5 NATO Emblem on a Grid BLM 7–6 Section 7.1 Extra Practice TM 7–1 How to Do Page 343 Example 1 Using TI-Nspire™ TM 7–2 How to Do Page 343 Example 1 Using Microsoft® Excel	**Essential:** #1, 3–6, 8–10, 13, 14, 18, 24–26 **Typical:** #1, 2, 4–7, 9, 10, 12–14, 15 or 16, 18, 24–26 **Extension/Enrichment:** #17, 19–24, 26	TR pages 262, 267 Chapter 7 Foldable, TR page 256	TR pages 264, 265, 267	
7.2 General Form • 80–120 min (TR page 268)	Students should be familiar with • domain and range • drawing a line graph • slope-intercept form of the equation of a line • least common denominator • evaluating expressions	• bottle of water • stopwatch • grid paper and ruler, or graphing technology	BLM 7–3 Chapter 7 Warm-Up BLM 7–7 Section 7.2 Extra Practice	**Essential:** #2, 3, 5, 6, 8, 10, 18, 19, 21 **Typical:** #1–7, 10 or 11, 12 or 13, 15, 18, 19, 21 **Extension/Enrichment:** #1, 4, 14–17, 20, 21	TR pages 270, 275 Chapter 7 Foldable, TR page 256	TR pages 272, 273, 274	
7.3 Slope-Point Form • 80–120 min (TR page 276)	Students should be familiar with • slope-intercept form of the equation of a line • general form of the equation of a line • isolating a variable • distributive property • evaluating expressions	• grid paper • ruler • SI measuring tape	BLM 7–3 Chapter 7 Warm-Up BLM 7–4 Chapter 7 Unit 3 Project BLM 7–8 7.3 Investigate: Figure 1 BLM 7–9 Section 7.3 Extra Practice	**Essential:** #1–3, 5a), b), 6a), c), d), 7–9, 11, 21–24 **Typical:** #1–5, 7, 8, 10, 11, 14, 24 **Extension/Enrichment:** #12, 13, 15–20, 22, 24	TR pages 278, 281 Chapter 7 Foldable, TR page 256	TR pages 280, 281	
7.4 Parallel and Perpendicular Lines • 80–120 min (TR page 282)	Students should be familiar with • meaning of parallel and perpendicular • slope-intercept form of the equation of a line • general form of the equation of a line • slope-point form of the equation of a line • isolating a variable • distributive property • evaluating expressions	• grid paper • scissors • ruler	BLM 7–3 Chapter 7 Warm-Up BLM 7–10 Section 7.4 Extra Practice	**Essential:** #1–5, 6a), c), e), 7a), c), e), 9–11, 25, 26 **Typical:** #1–5, 6a), c), e), 7a), c), e), 8, 11, 13, one of 14–16, 25, 26 **Extension/Enrichment:** #12, 14–19, 24–26	TR pages 283, 287 Chapter 7 Foldable, TR page 256	TR pages 285, 287	
Chapter 7 Review • 60–90 min (TR page 288)		• grid paper • ruler	BLM 7–6 Section 7.1 Extra Practice BLM 7–7 Section 7.2 Extra Practice BLM 7–9 Section 7.3 Extra Practice BLM 7–10 Section 7.4 Extra Practice	Have students do at least one question related to any concept, skill, or process that has been giving them trouble.	Chapter 7 Foldable, TR page 256	TR page 289	
Chapter 7 Practice Test • 45–60 min (TR page 290)		• grid paper • ruler	BLM 7–11 Chapter 7 Test	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. **Minimum:** #1–9, 12	TR page 291		TR page 291 BLM 7–11 Chapter 7 Test
Unit 3 Project • 80–100 min (TR page 292)		• ruler	Master 1 Project Rubric BLM 6–4 Chapter 6 Unit 3 Project BLM 7–4 Chapter 7 Unit 3 Project BLM U3–3 Unit 3 Project Final Report				TR page 294 Master 1 Project Rubric
Unit 3 Review and Test • 60–90 min (TR page 296)		• grid paper • ruler	BLM 7–12 Chapter 7 BLM Answers	Have students do at least one question related to any concept, skill, or process that has been giving them trouble.	Chapters 6 and 7 Foldables	TR page 296	TR page 296