CHAPTER

3

Linear Relations

Strand
Modelling Linear Relations

Student Text Pages
96–97

Suggested Timing
10–15 min

Related Resources
BLM 3.CO.1 Literacy Link: Verbal/Visual T-Chart

Key Terms

coefficient
linear relation
rate of change
rise
run
slope
y-intercept

Additional information and teaching materials for this chapter are available on the McGraw-Hill Ryerson web site at http://mcgrawhill.ca/books/foundations10. You will need your password to access this material.

Chapter Curriculum Specific Expectations

Graphing and Writing Equations of Lines

In this chapter, students will

ML2.01 connect the rate of change of a linear relation to the slope of a line, and define the slope as the ratio $m = \frac{\text{rise}}{\text{run}}$

ML2.02 identify, through investigation, $y = mx + b$ as a common form for the equation of a straight line, and identify the special cases $x = a$, $y = b$

ML2.03 identify, through investigation with technology, the geometric significance of m and b in the equation $y = mx + b$

ML2.04 identify, through investigation, properties of the slopes of lines and line segments (e.g., direction, positive or negative rate of change, steepness, parallelism), using graphing technology to facilitate investigations, where appropriate

ML2.05 graph lines by hand, using a variety of techniques (e.g., graph using the *y*-intercept and slope; graph $2x + 3y = 6$ using the *x*- and *y*-intercepts)

ML2.06 determine the equation of a line, given its graph, the slope and *y*-intercept, the slope and a point on the line, or two points on the line

Teaching Suggestions

Chapter Opener

- Students have been introduced to many of the concepts in this chapter in previous grades. Get a sense of students' prior knowledge by discussing concepts such as rate of speed, distance travelled over time, and what a graph of distance versus time might look like.
- Have students look at the Chapter Opener photograph and discuss the time/distance relation of a fast-moving train. Then, discuss the time/distance relation of other modes of transportation (e.g., plane, car, bike, walking). Discuss the similarities and differences.

Literacy Link

Distribute **BLM 3.CO.1 Literacy Link: Verbal/Visual T-Chart**. Instruct students to use the verbal/visual T-chart to help them use pictures and words to model linear relations. For more information on the Think Literacy program, visit http://www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy.

Career Profile

- The Career Profile provides an opportunity for students to discuss practical applications of the mathematics they are learning.
- Ask students, "Can you think of other careers that require an understanding and knowledge of linear relations?" Have students explain their examples. Ask students, "How is the mathematics of your examples similar to that of the speeding trains?"
- Ask students to think of how their parents or guardians might use linear relations in their jobs.

Chapter 3 Planning Chart

Section Suggested Timing	Student Text Page(s)	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 3 Opener • 10–15 min	96–97	• BLM 3.CO.1 Literacy Link: Verbal/Visual T-Chart		
Get Ready! • 30–75 min	98–99	• BLM 3.GR.1 Practice: Get Ready	• BLM 3.GR.2 Get Ready Self-Assessment Checklist	• calculators
3.1 Slope as a Rate of Change • 75–150 min	100–110	• BLM 3.1.1 Practice: Slope as a Rate of Change • BLM G1 Grid Paper • BLM G4 Four-Quadrant Grid	• BLM 3.1.2 Achievement Check Rubric	• calculators • graphing calculators • grid paper • rulers
3.2 Investigate Slope and *y*-Intercept Using Technology • 75–150 min	111–117	• BLM 3.2.1 Practice: Investigate Slope and *y*-Intercept Using Technology • BLM G1 Grid Paper		• calculators • graphing calculators
3.3 Properties of Slopes of Lines • 75–150 min	118–127	• BLM 3.3.1 Practice: Properties of Slopes of Lines • BLM G1 Grid Paper • BLM T1 *The Geometer's Sketchpad*® 4		• calculators • computers • *The Geometer's Sketchpad*® • graphing calculators • grid paper • rulers
3.4 Determine the Equation of a Line • 150–225 min	128–137	• BLM 3.4.1 Practice: Determine the Equation of a Line • BLM G1 Grid Paper • BLM G4 Four-Quadrant Grid	• BLM A3 Communication General Scoring Rubric	• calculators • graphing calculators • grid paper • rulers • toothpicks
3.5 Graph Linear Relations by Hand • 75–150 min	138–145	• BLM 3.5.1 Practice: Graph Linear Relations by Hand • BLM G1 Grid Paper • BLM G4 Four-Quadrant Grid	• BLM 3.5.2 Achievement Check Rubric • BLM A9 Self-Assessment Recording Sheet	• graphing calculators • grid paper • rulers
Chapter 3 Review • 75 min	146–147	• BLM 3.CR.1 Chapter 3 Review • BLM G1 Grid Paper • BLM G4 Four-Quadrant Grid		• calculators • graphing calculators • grid paper • rulers
Chapter 3 Practice Test • 60–75 min	148–149	• BLM G1 Grid Paper	• BLM 3.PT.1 Chapter 3 Practice Test • BLM 3.CT.1 Chapter 3 Test	• calculators • graphing calculators • grid paper • rulers
Chapter 3 Problem Wrap-Up • 20 min	149	• BLM G1 Grid Paper	• BLM 3.CP.1 Chapter 3 Problem Wrap-Up Rubric	• graphing calculators • grid paper • road maps (optional) • rulers

Chapter 3 Blackline Masters Checklist

	Title		Purpose
Chapter 3 Opener			
	BLM 3.CO.1	Literacy Link: Verbal/Visual T-Chart	Literacy
Get Ready!			
	BLM 3.GR.1	Practice: Get Ready	Practice
	BLM 3.GR.2	Get Ready Self-Assessment Checklist	Student Self-Assessment
3.1 Slope as a Rate of Change			
	BLM 3.1.1	Practice: Slope as a Rate of Change	Practice
	BLM 3.1.2	Achievement Check Rubric	Assessment
	BLM G4	Four-Quadrant Grid	Student Support
	BLM G1	Grid Paper	Student Support
3.2 Investigate Slope and *y*-Intercept Using Technology			
	BLM 3.2.1	Practice: Investigate Slope and *y*-Intercept Using Technology	Practice
	BLM G1	Grid Paper	Student Support
3.3 Properties of Slopes of Lines			
	BLM 3.3.1	Practice: Properties of Slopes of Lines	Practice
	BLM G1	Grid Paper	Student Support
	BLM T1	*The Geometer's Sketchpad*® 4	Technology
3.4 Determine the Equation of a Line			
	BLM 3.4.1	BLM 3.4.1 Practice: Determine the Equation of a Line	Practice
	BLM A3	Communication General Scoring Rubric	Assessment
3.5 Graph Linear Relations by Hand			
	BLM 3.5.1	Practice: Graph Linear Relations by Hand	Practice
	BLM 3.5.2	Achievement Check Rubric	Assessment
	BLM G4	Four-Quadrant Grid	Student Support
	BLM A9	Self-Assessment Recording Sheet	Assessment
Chapter 3 Review			
	BLM 3.CR.1	Chapter 3 Review	Review
	BLM G1	Grid Paper	Student Support
	BLM G4	Four-Quadrant Grid	Student Support

	Title		Purpose
Chapter 3 Practice Test			
	BLM 3.PT.1	Chapter 3 Practice Test	Diagnostic Assessment
	BLM 3.CT.1	Chapter 3 Test	Summative Assessment
	BLM G1	Grid Paper	Student Support
Chapter 3 Problem Wrap-Up			
	BLM 3.CP.1	Chapter 3 Problem Wrap-Up Rubric	Summative Assessment
	BLM G1	Grid Paper	Student Support

Get Ready!

Student Text Pages
98–99

Suggested Timing
30–75 min

Tools
• calculators

Related Resources
BLM 3.GR.1 Practice: Get Ready
BLM 3.GR.2 Get Ready Self-Assessment Checklist

Common Errors

- Some students may reverse the coordinates when graphing on a coordinate grid.

R_x Use an overhead and practice graphing on a coordinate grid as a class. Provide additional remediation where necessary.

Accommodations

Perceptual—Tiles, cubes, integer tiles, or other manipulatives may help some students with Get Ready questions 1, 2, 4, 5, 7, and 8.

Teaching Suggestions

- Have students attempt to do as much of question 3 as they can without the use of a calculator. For part (f), explain to students that they can express 0.625 as $\frac{625}{1000}$ (simple place value) and then divide out common factors (e.g., divide the numerator and the denominator by 5, three times) to arrive at $\frac{5}{8}$. This approach strengthens numeric skills and downplays reliance on a calculator.
- You may wish to use **BLM 3.GR.1 Practice: Get Ready** as remediation or extra practice.
- Answers to the Get Ready questions can be taken up in class or collected to provide a diagnostic assessment of students' prior knowledge and understanding.
- All BLMs referred to throughout this chapter can be found in the *Foundations of Mathematics 10:* Teacher's Resource CD-ROM.

Assessment

- The Get Ready is an excellent form of diagnostic assessment. Use it to determine students' preparedness to move on and to determine where remediation is necessary.
- The Get Ready can be used by students as a self-assessment. You may wish to have students use **BLM 3.GR.2 Get Ready Self-Assessment Checklist** as a self-assessment tool.
- Encourage students to seek assistance from you, a fellow student, or ask for **BLM 3.GR.1 Practice: Get Ready** in the areas where they feel they need help before moving on. This is an opportunity for students to gain confidence in what they already know and reinforce that math is a cumulative subject where skills already learned are put to use in new ways.

Chapter Problem

- Have students discuss their understanding of the topic, and consider how Jim's problem relates to the Chapter Opener.
- The Chapter Problem questions are designed to help students move toward the Chapter Problem Wrap-Up. You may wish to assign these questions as students work through the sections. Alternatively, you may wish to assign the Chapter Problem questions and Wrap-Up when students have completed the chapter, as part of a summative assessment.