4 Scale Factors and Similarity

General Outcomes

- Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
- Describe and analyze position and motion of objects and shapes.

Specific Outcomes

SS3 Demonstrate an understanding of similarity of polygons.

SS4 Draw and interpret scale diagrams of 2-D shapes.

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

Section	Understanding Concepts, Skills, and Processes
4.1	✓ identify enlargements and reductions and interpret the scale factor
	✓ draw enlargements and reductions to scale
4.2	✓ identify scale diagrams and interpret the scale factor
	✓ determine the scale factor for scale diagrams
	✓ determine if a given diagram is proportional to the original shape
4.3	✓ determine similar triangles
	✓ determine if diagrams are proportional
	✓ solve problems using the properties of similar triangles
4.4	✓ identify similar polygons and explain why they are similar
	✓ draw similar polygons
	✓ solve problems using the properties of similar polygons

Assessment	Supporting Learning
Assessment *for* Learning	
Method 1: Use the Math Link introduction on page 129 in *MathLinks 9* to activate student 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 ratios and scale diagrams.	• **BLM 4–1 Chapter 4 Math Link Introduction** provides scaffolding for the Math Link introduction. • 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 the Get Ready materials available on **BLM 4–2 Chapter 4 Get Ready**, in the *MathLinks 9 Practice and Homework Book*, and at the www.mathlinks9.ca book site.
Assessment *as* Learning	
Literacy Link (page 127) At the beginning of the chapter, work with students to model the use of a spider map.	• As students move through sections 4.1 to 4.4, have them complete their spider map, so they will have a useful tool for reviewing the skills and concepts covered in the chapter. • Encourage students to develop definitions for terms in their own words. • Consider providing real-life examples that students may be familiar with to help them understand the terms. • Some students may benefit from using the glossary starting on page xx to help them.
Chapter 4 Foldable As students work on each section in Chapter 4, 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.
Assessment *for* Learning	
BLM 4–3 Chapter 4 Warm-Up This BLM includes four warm-ups, one to be used at the beginning of each section. Each warm-up provides cumulative review questions for the entire student resource to that point, as well as mental math practice.	• As students complete questions from previous chapters, 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 mental math calculations.

Problems of the Week

Have all students try at least one of the problems on **BLM 4–4 Chapter 4 Problems of the Week**. Many of these problems require students to think outside the box and experiment with a variety of approaches. Some have definitive answers; others can be answered in more than one way.

Students can take the problems home and consult with parents or guardians, work with other students when their work is completed, or try them on their own. The questions take a varying amount of time to solve, depending on the particular student and the problem itself. You may wish to give out these problems at the beginning of the chapter and discuss the solutions at appropriate times throughout your work on the chapter.

Chapter 4 Planning Chart

Section/ Suggested Timing	Prerequisite Skills	Materials/Technology	Teacher's Resource Blackline Masters	Exercise Guide	Extra Support	Assessment		
						Assessment *as* Learning	Assessment *for* Learning	Assessment *of* Learning
Chapter Opener • 40–50 minutes (TR page 181)	Students should be familiar with • calculating area • determining ratios and proportions	• sheet of 11 × 17 paper • ruler • two sheets of 8.5 × 11 paper • scissors • two sheets of 8.5 × 11 grid paper • stapler	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 17 Spider Map BLM 4–1 Chapter 4 Math Link Introduction BLM 4–2 Chapter 4 Get Ready BLM 4–4 Chapter 4 Problems of the Week		Online Learning Centre	TR page 180 Chapter 4 Foldable, TR page 180	TR page 180	
4.1 Enlargements and Reductions • 80–100 minutes (TR page 185)	Students should be familiar with • measuring angles and side lengths	• tracing paper • ruler • grid paper • computer with Internet access (optional)	Master 2 Communication Peer Evaluation Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 10 2 Centimetre Grid Paper BLM 4–3 Chapter 4 Warm-Up BLM 4–5 Section 4.1 Extra Practice BLM 4–6 Section 4.1 Math Link	**Essential:** #1, 2, 4a) *or* b), 6a) *or* b), 7, 9, Math Link **Typical:** #1, 2, 4a) *or* b), 6a) *or* b), 7, 9, 11, 13, Math Link **Extension/Enrichment:** #1, 2, 13, 15, 16 *or* 14 and 17, Math Link	*MathLinks 9 Practice and Homework Book* *MathLinks 9 Solutions Manual*	Master 2 Communication Peer Evaluation TR pages 187, 193 Math Learning Log, TR page 193 Chapter 4 Foldable, TR page 193	TR pages 189, 193	
4.2 Scale Diagrams • 80–100 minutes (TR page 194)	Students should be familiar with • calculating proportions • calculating ratios • finding equivalent fractions	• ruler	Master 2 Communication Peer Evaluation BLM 4–3 Chapter 4 Warm-Up BLM 4–7 Section 4.2 Extra Practice BLM 4–8 Section 4.2 Math Link	**Essential:** #1–3, 4 *or* 5, 6 *or* 7, 8 *or* 9, one of 10–12, Math Link **Typical:** #1–3, 4 *or* 5, 6 *or* 7, 8 *or* 9, one of 10–12, three of 13–18, 19, Math Link **Extension/Enrichment:** #1–3, one of 10–12, 19–22, Math Link	*MathLinks 9 Practice and Homework Book* *MathLinks 9 Solutions Manual*	Master 2 Communication Peer Evaluation TR pages 195, 201 Math Learning Log, TR page 201 Chapter 4 Foldable, TR page 201	TR pages 198, 201	
4.3 Similar Triangles • 80–100 minutes (TR page 202)	Students should be familiar with • measuring angles • scale factors	• tracing paper • ruler • protractor • grid paper	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper BLM 4–3 Chapter 4 Warm-Up BLM 4–9 Section 4.3 Extra Practice BLM 4–10 Section 4.3 Math Link	**Essential:** #1, 2, 4 *or* 5, 6 *or* 7, 8, 9 *or* 10, 12, Math Link **Typical:** #1, 2, 4 *or* 5, 6 *or* 7, 8, 9 *or* 10, two of 12–15, Math Link **Extension/Enrichment:** #1, 2, 15, 16, 18, three of 19–23, Math Link	*MathLinks 9 Practice and Homework Book* *MathLinks 9 Solutions Manual*	TR pages 203, 209 Math Learning Log, TR page 209 Chapter 4 Foldable, TR page 209	TR pages 206, 209	
4.4 Similar Polygons • 80–100 minutes (TR page 210)	Students should be familiar with • polygons • sum of interior angles • calculating area and volume	• tracing paper • protractor • ruler • grid paper	Master 2 Communication Peer Evaluation Master 7 Isometric Dot Paper Master 8 Centimetre Grid Paper Master 10 2 Centimetre Grid Paper BLM 4–3 Chapter 4 Warm-Up BLM 4–11 Section 4.4 Extra Practice BLM 4–12 Section 4.4 Math Link	**Essential:** #1, 2, 3a) *or* b), 5–7, Math Link **Typical:** #1, 2, 3a) *or* b), 5–7, two of 8–12, Math Link **Extension/Enrichment:** #1, 2, 7, 13–18, Math Link	*MathLinks 9 Practice and Homework Book* *MathLinks 9 Solutions Manual*	Master 2 Communication Peer Evaluation TR pages 211, 216 Math Learning Log, TR page 216 Chapter 4 Foldable, TR page 216	TR pages 213, 216	
Chapter 4 Review • 40–50 minutes (TR page 217)		• grid paper • ruler • protractor	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 10 2 Centimetre Grid Paper BLM 4–5 Section 4.1 Extra Practice BLM 4–7 Section 4.2 Extra Practice BLM 4–9 Section 4.3 Extra Practice BLM 4–11 Section 4.4 Extra Practice	Have students do at least one question related to any concept, skill, or process that has been giving them trouble.	*MathLinks 9 Practice and Homework Book* *MathLinks 9 CAB*	Chapter 4 Foldable, TR page 217	TR page 218	
Chapter 4 Practice Test • 40–50 minutes (TR page 219)		• ruler • protractor • grid paper	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper BLM 4–13 Chapter 4 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:** #2–5, 7, 8, 11, 13–15	*MathLinks 9 CAB*	TR page 220		TR page 220 BLM 4–13 Chapter 4 Test
Chapter 4 Math Link: Wrap It Up! • 80–100 minutes (TR page 221)		• grid paper • ruler	Master 1 Project Rubric Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper BLM 4–1 Chapter 4 Math Link Introduction BLM 4–6 Section 4.1 Math Link BLM 4–8 Section 4.2 Math Link BLM 4–10 Section 4.3 Math Link BLM 4–12 Section 4.4 Math Link BLM 4–14 Chapter 4 Math Link: Wrap It Up!		Online Learning Centre			TR page 221 Master 1 Project Rubric
Chapter 4 Challenge: Shadow, Shadow • 40–50 minutes (TR page 223)		• direct source of light (e.g., flashlight, desk lamp) • metre stick • ruler	Master 1 Project Rubric		Online Learning Centre		TR page 224	TR page 224 Master 1 Project Rubric
Chapter 4 Challenge: Graphic Designer • 40–50 minutes (TR page 226)		• ruler • grid paper • coloured pencils or markers	Master 1 Project Rubric Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper		Online Learning Centre		TR page 227	TR page 227 Master 1 Project Rubric
Chapters 1–4 Review • 60–75 minutes (TR page 229)		• grid paper • ruler • calculator	Master 7 Isometric Dot Paper Master 8 Centimetre Grid Paper	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:** #1–3, 5–18, 20–22	*MathLinks 9 CAB*	TR page 231 Chapters 1, 2, 3, and 4 Foldable Math Learning Log, TR page 231	TR page 231	
Chapter 4 Task • 40–50 minutes (TR page 232)		• paper of different sizes and thicknesses	Master 1 Project Rubric BLM 4–15 Chapter 4 BLM Answers		Online Learning Centre			TR page 233 Master 1 Project Rubric