Multiplying and Dividing Polynomials

General Outcomes
- Represent algebraic expressions in multiple ways.

Specific Outcomes

PR7 Model, record and explain the operations of multiplication and division of polynomial expressions (limited to polynomials of degree less than or equal to 2) by monomials, concretely, pictorially and symbolically.

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

Section	Understanding Concepts, Skills, and Processes
7.1	✓ model multiplication of a monomial by a monomial and record the process algebraically
	✓ model division of a monomial by a monomial and record the process algebraically
	✓ apply a personal strategy for multiplication and division of a monomial by a monomial
7.2	✓ model multiplication of a polynomial by a monomial and record the process algebraically
	✓ apply a personal strategy for multiplication of a polynomial by a monomial
	✓ simplify polynomial expressions
	✓ identify errors in a simplification of a polynomial expression
7.3	✓ model division of a polynomial by a monomial and record the process algebraically
	✓ apply a personal strategy for division of a polynomial by a monomial
	✓ simplify polynomial expressions
	✓ identify errors in a simplification of a polynomial expression

Assessment	Supporting Learning
Assessment *for* Learning	
Method 1: Use the Math Link introduction on page 253 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 multiplying and dividing polynomials, including how to use models, such as area models, algebra tiles, and diagrams, and how to use algebraic symbols.	• **BLM 7–1 Chapter 7 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 7–2 Chapter 7 Get Ready**, in the *MathLinks 9 Practice and Homework Book*, and at the www.mathlinks9.ca book site.
Assessment *as* Learning	
Literacy Link (page 251) Before starting the chapter, have students develop a spider map showing what they currently know and understand about multiplying and dividing polynomials, and provide examples of polynomials they are familiar with.	• Encourage students to use the glossary starting on page XX to help them. • Brainstorm definitions, methods, examples, and connections among the concepts. Encourage students to use the brainstormed ideas to develop some of their own. • Use the spider maps to identify any misconceptions students may have. Deal with these misconceptions during the appropriate section of the chapter.
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.
Assessment *for* Learning	
BLM 7–3 Chapter 7 Warm-Up This BLM includes three 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 7–4 Chapter 7 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 7 Planning Chart

Section/ Suggested Timing	Prerequisite Skills	Materials/Technology	Teacher's Resource Blackline Masters	Exercise Guide	Extra Support	Assessment *as* Learning	Assessment *for* Learning	Assessment *of* Learning
Chapter Opener • 40–50 minutes (TR page 347)	Students should be familiar with • algebraic terms including *variable*, *coefficient*, and *constant*	• sheet of 11 × 17 paper • two sheets of 8.5 × 11 paper • three sheets of 8.5 × 11 grid paper • ruler • stapler • scissors	Master 17 Spider Map BLM 7–1 Chapter 7 Math Link Introduction BLM 7–2 Chapter 7 Get Ready BLM 7–4 Chapter 7 Problems of the Week		Online Learning Centre	TR page 346 Chapter 7 Foldable, TR page 346	TR page 346	
7.1 Multiplying and Dividing Monomials • 60–80 minutes (TR page 351)	Students should be familiar with • simplifying algebraic expressions • working with models such as diagrams or algebra tiles • modelling problem situations with linear equations • order of operations	• grid paper • algebra tiles	Master 2 Communication Peer Evaluation Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 11 Algebra Tiles (Positive Tiles) Master 12 Algebra Tiles (Negative Tiles) BLM 7–3 Chapter 7 Warm-Up BLM 7–7 Section 7.2 Extra Practice BLM 7–8 Section 7.2 Math Link	**Essential:** #1–3, 5, 7, 9, 11, 13, 15, 18, Math Link **Typical:** #1–3, 5, 7, 9, 11, 13, 15, 17–19, Math Link **Extension/Enrichment:** #1–3, 7, 15, 17, 18, 21–25	*MathLinks 9 Practice and Homework Book* *MathLinks 9 Solutions Manual*	TR pages 353, 360 Math Learning Log, TR page 360 Chapter 7 Foldable, TR page 360 Master 2 Communication Peer Evaluation	TR pages 356, 360	
7.2 Multiplying Polynomials by Monomials • 60–80 minutes (TR page 361)	Students should be familiar with • simplifying algebraic expressions • working with models such as diagrams or algebra tiles • modelling problem situations with linear equations • order of operations	• grid paper • algebra tiles	Master 2 Communication Peer Evaluation Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 11 Algebra Tiles (Positive Tiles) Master 12 Algebra Tiles (Negative Tiles) BLM 7–3 Chapter 7 Warm-Up BLM 7–7 Section 7.2 Extra Practice BLM 7–8 Section 7.2 Math Link	**Essential:** #1–4, 6, 8, 10, 12, 15, Math Link **Typical:** #1–4, 6, 8, 10, 12, 15, 16, Math Link **Extension/Enrichment:** #1–3, 6, 10, 12, 15, 16, 19–21	*MathLinks 9 Practice and Homework Book* *MathLinks 9 Solutions Manual*	TR pages 363, 368 Math Learning Log, TR page 368 Chapter 7 Foldable, TR page 368 Master 2 Communication Peer Evaluation	TR page 368	
7.3 Dividing Polynomials by Monomials • 60–80 minutes (TR page 369)	Students should be familiar with • simplifying algebraic expressions • working with models such as diagrams or algebra tiles • modelling problem situations with linear equations • order of operations	• algebra tiles • centimetre cubes • grid paper • ruler	Master 2 Communication Peer Evaluation Master 6 Square Dot Paper Master 7 Isometric Dot Paper Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 11 Algebra Tiles (Positive Tiles) Master 12 Algebra Tiles (Negative Tiles) BLM 7–3 Chapter 7 Warm-Up BLM 7–9 Section 7.3 Extra Practice BLM 7–10 Section 7.3 Math Link	**Essential:** #2–4, 6, 8, 10, 13, Math Link **Typical:** #2–4, 6, 8, 10, 11, 14, Math Link **Extension/Enrichment:** #2, 3, 8, 10–15, 17	*MathLinks 9 Practice and Homework Book* *MathLinks 9 Solutions Manual*	TR pages 371, 376 Math Learning Log, TR page 376 Chapter 7 Foldable, TR page 376 Master 2 Communication Peer Evaluation	TR pages 373, 376	
Chapter 7 Review • 40–50 minutes (TR page 377)		• algebra tiles	Master 11 Algebra Tiles (Positive Tiles) Master 12 Algebra Tiles (Negative Tiles) BLM 7–5 Section 7.1 Extra Practice BLM 7–7 Section 7.2 Extra Practice BLM 7–9 Section 7.3 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 7 Foldable, TR page 378	TR page 378	
Chapter 7 Practice Test • 40–50 minutes (TR page 379)		• algebra tiles	Master 11 Algebra Tiles (Positive Tiles) Master 12 Algebra Tiles (Negative Tiles) 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:** #1–5, 9, 11, 12	*MathLinks 9 CAB*	TR page 380		TR page 380 BLM 7–11 Chapter 7 Test
Chapter 7 Math Link: Wrap It Up! • 60–75 minutes (TR page 381)		• ruler • compass • grid paper	Master 1 Project Rubric Master 6 Square Dot Paper Master 7 Isometric Dot Paper Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper BLM 7–1 Chapter 7 Math Link Introduction BLM 7–6 Section 7.1 Math Link BLM 7–8 Section 7.2 Math Link BLM 7–10 Section 7.3 Math Link BLM 7–12 Chapter 7 Wrap It Up!		Online Learning Centre			TR page 382 Master 1 Project Rubric
Chapter 7 Challenge: Design a Card Game • 80–100 minutes (TR page 384)		• at least 30 index cards or heavy paper for cutting out cards per pair of students, or heavy paper for cutting out cards	Master 1 Project Rubric		Online Learning Centre		TR page 385	TR page 385 Master 1 Project Rubric
Chapter 7 Challenge: Polynomial Puzzle • 50–60 minutes (TR page 387)		• scissors	BLM 7–13 Sample Polynomial Puzzle				TR page 388	
Chapters 5–7 Review • 60–75 minutes (TR page 389)		• algebra tiles • grid paper • ruler	Master 11 Algebra Tiles (Positive Tiles) Master 12 Algebra Tiles (Negative Tiles) Master 8 Centimetre Grid Paper Master 9 0.5 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:** #1–4, 7–11, and 12–16	*MathLinks 9 CAB*	TR page 391 Chapters 5, 6, and 7 Foldable Math Learning Log, TR page 391	TR page 391	
Chapter 7 Task • 40–50 minutes (TR page 392)		• measuring tape • grid paper • protractor • television or computer monitor (optional)	Master 1 Project Rubric Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper BLM 7–14 Chapter 7 BLM Answers		Online Learning Centre			TR page 393 Master 1 Project Rubric