Rational Expressions and Equations

6

General Outcome

Develop algebraic reasoning and number sense.

Specific Outcomes

AN4 Determine equivalent forms of rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials).

AN5 Perform operations on rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials).

AN6 Solve problems that involve rational equations (limited to numerators and denominators that are monomials, binomials or trinomials).

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

Section	Understanding Concepts, Skills, and Processes
6.1	✓ determine the non-permissible values for a rational expression
	✓ simplify a rational expression
6.2	✓ compare the strategies for writing equivalent forms of rational expressions to the strategies for writing equivalent forms of rational numbers
	✓ determine the non-permissible values when performing operations on rational expressions
	✓ determine, in simplest form, the product or quotient of rational expressions
6.3	✓ compare the strategies for performing a given operation on rational expressions to the strategies for performing the same operation on rational numbers
	✓ determine the non-permissible values when performing operations on rational expressions
	✓ determine, in simplest form, the sum or difference of rational expressions with the same denominator
	✓ determine, in simplest form, the sum or difference of rational expressions in which the denominators are not the same and which may or may not contain common factors
6.4	✓ determine the non-permissible values for the variable in a rational equation
	✓ determine the solution to a rational equation algebraically, and explain the process used to solve the equation
	✓ solve problems by modelling a situation using a rational equation

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 to it during the chapter.	• During work on the chapter, have students keep track of what they need to work on. 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 308 in *Pre-Calculus 11* 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 rational expressions and equations, and how these might be used to model and solve real-world challenges.	• Have students use their list of what they need to work on to keep track of any 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 6–3 Chapter 6 Prerequisite Skills**. This material is on the Teacher CD of this Teacher's Resource and mounted on the www.mhrprecalc11.ca book site.
Assessment *as* Learning	
As students work on each section in Chapter 6, have them keep track of any problems they are having.	• As students complete each section, have them revisit 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. • Encourage students to write examples of their own in their notebook or math portfolio. Students should have an example for each method that is covered in the chapter.
Assessment *for* Learning	
BLM 6–4 Chapter 6 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 readiness for the chapter material. • Have students share their strategies for completing mathematics 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 • 45–60 min (TR page 207)			BLM 6–1 Chapter 6 Self-Assessment BLM 6–2 Factoring Polynomials Flowchart BLM 6–3 Chapter 6 Prerequisite Skills BLM U3–1 Unit 3 Project Checklist				
6.1 Rational Expressions • 90–120 min (TR page 209)	Students should be familiar with • modelling with algebra tiles • factoring • mathematical operations with fractions • rules of exponents	• algebra tiles • coloured sheets with domino shapes on them • scissors	BLM 6–4 Chapter 6 Warm-Up BLM 6–5 Section 6.1 Extra Practice	**Essential:** #1, 2a), c), 3, 4a), c), 5–11, 13, 19–22, 29, 30 **Typical:** #2, 4, 5, 8–22, 23 or 24, 29–32 **Extension/Enrichment:** #14, 16, 17, 25–32	TR pages 211, 216	TR pages 214, 216	
6.2 Multiplying and Dividing Rational Expressions • 90–120 min (TR page 217)	Students should be familiar with • multiplying and dividing fractions • modelling with manipulatives • rules of exponents • factoring • least common denominators	• paper for folding • coloured pencils • various manipulatives (e.g., fraction strips) • grid paper	BLM 6–4 Chapter 6 Warm-Up BLM 6–6 Section 6.2 Extra Practice	**Essential:** #1–8, 10–12, 14, 21–23 **Typical:** #2, 4–6, 8–13, two of 14–18, 21–23 **Extension/Enrichment:** #11, 15, 16, 23	TR pages 219, 223	TR pages 221, 223	
6.3 Adding and Subtracting Rational Expressions • 90–120 min (TR page 224)	Students should be familiar with • adding and subtracting fractions • least common denominators	• fraction strips • pattern blocks • grid paper	BLM 6–4 Chapter 6 Warm-Up BLM 6–7 Section 6.3 Extra Practice	**Essential:** #1–4, 5a)–c), 6a)–c), 7a), b), 8, 9, 10a), b), 12, 24, 28 **Typical:** #2–4, 5b), d), f), 7c), d), 8, 9, 10a), b), 11–13, 15b), one of 14, 16, or 17, 18, 25, 27, 28 **Extension/Enrichment:** #11b), 15d), 18–24, 26–28	TR pages 226, 231	TR pages 228, 231	
6.4 Rational Equations • 120–150 min (TR page 232)	Students should be familiar with • solving equations • reducing to the simplest form • extraneous roots • mathematical modelling		BLM 6–4 Chapter 6 Warm-Up BLM 6–8 Section 6.4 Extra Practice	**Essential:** #1–7, two of 8–11, 14, 19, 24, 25, 27 **Typical:** #1, 4–7, one of 9–11, one of 12–14, one of 15–19, 24–27 **Extension/Enrichment:** #3, 7, 20–27	TR pages 233, 238	TR pages 235, 238	
Chapter 6 Review • 90–120 min (TR page 239)			BLM 6–5 Section 6.1 Extra Practice BLM 6–6 Section 6.2 Extra Practice BLM 6–7 Section 6.3 Extra Practice BLM 6–8 Section 6.4 Extra Practice	Have students do at least one question related to any concept, skill, or process that has been giving them trouble.		TR page 239	
Chapter 6 Practice Test • 60–75 min (TR page 240)			BLM 6–9 Chapter 6 Test BLM 6–10 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. **Minimum:** #1–9	TR page 241		TR page 241 BLM 6–9 Chapter 6 Test