6 Trigonometric Identities

General Outcome

Develop trigonometric reasoning.

Specific Outcomes

T5 Solve, algebraically and graphically, first and second degree trigonometric equations with the domain expressed in degrees and radians.

T6 Prove trigonometric identities, using:

- reciprocal identities
- quotient identities
- Pythagorean identities
- sum or difference identities (restricted to sine, cosine and tangent)
- double-angle identities (restricted to sine, cosine and tangent)

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

Section	Understanding Concepts, Skills, and Processes
6.1	✓ verify a trigonometric identity numerically and graphically using technology
	✓ understand and apply reciprocal, quotient, and Pythagorean identities
	✓ determine non-permissible values of trigonometric identities
	✓ explain the difference between a trigonometric identity and a trigonometric equation
6.2	✓ apply sum, difference, and double-angle identities to verify the equivalence of trigonometric expressions
	✓ verify a trigonometric identity numerically and graphically using technology
6.3	✓ prove trigonometric identities algebraically
	✓ understand the difference between verifying and proving an identity
	✓ understand that verifying the equality of two sides of a potential identity for a given value is insufficient to prove the identity
	✓ graph to show the potential validity of a trigonometric identity, using technology
6.4	✓ solve trigonometric equations algebraically using known identities
	✓ determine exact solutions for trigonometric equations where possible
	✓ determine the general solution for trigonometric equations
	✓ identify and correct errors in a solution for a trigonometric equation

Assessment	Supporting Learning
Assessment *for* Learning	
Method 1: Use the introduction on page 288 in *Pre-Calculus 12* 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 trigonometric functions and trigonometric identities.	• Have students update their list of what they need to work on and keep track of the skills and processes that need attention. • Students who require activation of prerequisite skills may wish to complete **BLM 6–1 Chapter 6 Prerequisite Skills**. This material is on the Teacher CD of this Teacher's Resource and mounted on the www.mcgrawhill.ca/school/learningcentres 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 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. • 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 6–1 Chapter 6 Prerequisite Skills This master provides a review of prerequisite skills needed for the chapter.	• Use the Prerequisite Skills blackline master to provide additional opportunities for students to demonstrate their readiness for the chapter material.

Chapter 6 Planning Chart

Section/ Suggested Timing	Prerequisite Skills	Materials/Technology	Teacher's Resource Blackline Masters	Exercise Guide	Assessment *as* Learning	Assessment *for* Learning	Assessment *of* Learning	Web Link www.mcgrawhill.ca/school/learningcentres
Chapter Opener • 45–60 min (TR page 145)			BLM 6–1 Chapter 6 Prerequisite Skills BLM U2–1 Unit 2 Project Checklist					• careers of athletic therapists and kinesiologists
6.1 Reciprocal, Quotient, and Pythagorean Identities • 60–90 min (TR page 146)	Students should be familiar with • the trigonometric ratios • constructing and interpreting graphs of trigonometric functions • the concepts of domain, range, radians, reciprocals, and quotients • right triangles and the Pythagorean theorem	• grid paper • ruler • graphing technology	Master 3 Centimetre Grid Paper BLM 6–2 Section 6.1 Extra Practice	**Essential:** #1, 3, 5, 7, 8, 10, 11 **Typical:** #1, 4, 6–8, 10, 12, 13, C1–C3 **Extension/Enrichment:** #14–17, C2, C3	TR pages 147, 149	TR pages 148, 149		
6.2 Sum, Difference, and Double-Angle Identities • 90–120 min (TR page 150)	Students should be familiar with • the unit circle and the signs of the trigonometric ratios in the different quadrants • transformations of functions	• ruler • protractor	BLM 6–3 Section 6.2 Extra Practice	**Essential:** #1–4, 6–13 **Typical:** #1, 2, 5–9, 11, 14–16, 18 or 19, C1–C3 **Extension/Enrichment:** #14, 15, 17, 18 or 19, 20–24, C1–C3	TR pages 151, 153	TR pages 152, 153		
6.3 Proving Identities • 60–90 min (TR page 154)	Students should be familiar with • trigonometric identities • the concepts of factoring and simplifying expressions	• graphing technology	BLM 6–4 Section 6.3 Extra Practice	**Essential:** #1–5, 7–10, 12, 13 **Typical:** #1–9, 12–14, 15, C1, C2 **Extension/Enrichment:** #11, 15–18, C1, C3	TR pages 155, 157	TR pages 156, 157		
6.4 Solving Trigonometric Equations Using Identities • 60–90 min (TR page 158)	Students should be familiar with • how to substitute expressions • solving systems of equations by graphing	• graphing technology	BLM 6–5 Section 6.4 Extra Practice	**Essential:** #1–8, 10 **Typical:** #1–6, 9, 10, 12, two of 13–17, C1, C2 **Extension/Enrichment:** #11, 12, 15, 16, 19, 20, C2, C3	TR pages 159, 161	TR pages 160, 161		• a guide to fades and cross fades in audio editing
Chapter 6 Review and Practice Test • 60–90 min each (TR page 162)		• graphing technology	BLM 6–2 Section 6.1 Extra Practice BLM 6–3 Section 6.2 Extra Practice BLM 6–4 Section 6.3 Extra Practice BLM 6–5 Section 6.4 Extra Practice BLM 6–6 Chapter 6 Study Guide BLM 6–7 Chapter 6 Test	Have students do at least one question related to any concept, skill, or process that has been giving them trouble. **Chapter 6 Review minimum:** #1–4, 7–9, 11–16, 18, 19, 21 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. **Chapter 6 Practice Test minimum:** #1–13		TR page 162	TR page 162 BLM 6–7 Chapter 6 Test	
Unit 2 Project Wrap-Up • 90–120 min (TR page 163)			Master 1 Holistic Project Rubric Master 2 Ana-Holistic Project Rubric BLM U2–1 Unit 2 Project Checklist				TR page 164 Master 1 Holistic Project Rubric Master 2 Ana-Holistic Project Rubric	• sample Unit 2 Project Holistic Rubric • sample Unit 2 Project Ana-Holistic Rubric
Unit 2 Cumulative Review and Test • 60–90 min each (TR page 165)		• graphing technology • grid paper • ruler	Master 3 Centimetre Grid Paper BLM U2–2 Unit 2 Test BLM 6–8 Chapter 6 BLM Answers	Have students do at least one question related to any concept, skill, or process that has been giving them trouble. 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.		TR page 165	TR page 165	