1 Trigonometry

Strand
Geometry and Trigonometry

Student Text Pages
2–55

Suggested Timing
10 min

Related Resources
BLM A-4 Presentation Checklist

Key Terms

adjacent
angle of depression
angle of elevation
angle of inclination
complementary
cosine law
hypotenuse
opposite
sine law

Additional information and teaching materials for this chapter are available on the McGraw-Hill Ryerson Web-site at *www.mcgrawhill.ca/books/foundations11*. You will need your password to access this material.

Chapter Curriculum Specific Expectations

Applying the Sine Law and the Cosine Law in Acute Triangles

In this chapter, students will

GT2.01 solve problems, including those that arise from real-world applications (e.g., surveying, navigation), by determining the measure of the sides and angles of right triangles using the primary trigonometric ratios

GT2.02 verify, through investigation using technology (e.g., dynamic geometry software spreadsheet), the sine law and the cosine law (e.g., compare using dynamic geometry software, the ratios $\frac{a}{\sin A}$, $\frac{b}{\sin B}$, and $\frac{c}{\sin C}$ in triangle ABC while dragging one of the vertices)

GT2.03 describe conditions that guide when it is appropriate to use the sine law or the cosine law, and use these laws to calculate sides and angles in acute triangles

GT2.04 solve problems that arise from real-world applications involving metric and imperial measurements and that require the use of the sine law or the cosine law in acute triangles

Teaching Suggestions

Chapter Opener

- Have students look up definitions of key words in the glossary.

Technology

- The curriculum expectations for this course require heavy use of technology. Strong support for technology use has been included in the lesson designs.
- A scientific calculator provides strong support for students. Encourage students to have such a calculator available on their desks at all times, for use as required.
- *The Geometer's Sketchpad*® software is the most common package in use in Ontario. If your background makes you more comfortable with other design software packages, use them instead.
- *The Geometer's Sketchpad*® is licensed for use in Ontario by students at home. Consider providing each student with a copy to install on a home computer so they can use *The Geometer's Sketchpad*® as a tool for homework. This greatly expands the kinds of homework you can assign, and may alleviate problems of access to school computers. Ensure that students without a computer at home have an alternative. You may wish to pair students without access to a computer with classmates who have access. You may also wish to install the software on "public use" computers in the school, such as library computers.
- Problems of access to technology occur in most schools. Every attempt has been made to provide alternative paper and pencil activities. Although these ensure that the content can be taught, it is important to use technology as frequently as possible.
- You can refer to the Technology Appendix in the student book and the related technology BLMs for help or review.

Career Profile

Have students discuss what they know about surveyors. As an extension, have students research this career and other similar careers, and present their findings to the class. You may wish to use **BLM A-4 Presentation Checklist** to assess students' presentations.

Using their research, have students discuss:

- What a surveyor does.
- What type of education and training are needed for this career.
- Another career that is similar.
- The differences in the training and education required for the similar career.

You may wish to have students include their research in their portfolios.

For more career resources for your students, see the McGraw-Hill Ryerson Web-site at *www.mcgrawhill.ca/books/foundations11*.

Chapter 1 Planning Chart

Section Suggested Timing	Student Text Page(s)	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 1 Opener • 10 min	2–3		• BLM A-4 Presentation Checklist	
Prerequisite Skills • 70 min	4–5	• BLM 1-1 Prerequisite Skills	• BLM 1-2 Prerequisite Skills Self-Assessment Checklist	
1.1 Revisit the Primary Trigonometric Ratios • 70 min	6–15	• BLM 1-3 Section 1.1 Revisit the Primary Trigonometric Ratios • BLM T-2 *The Geometer's Sketchpad®3* • BLM T-3 *The Geometer's Sketchpad®4*		• *The Geometer's Sketchpad®* • computers • calculators *Optional* • pencil and paper • rulers • protractors
1.2 Solve Problems Using Trigonometric Ratios • 70 min	16–23	• BLM 1-4 Section 1.2 Solve Problems Using Trigonometric Ratios • BLM 1-5 Section 1.2 Make Your Own Clinometerl		• protractors • straws • string • tape • small weights or paper clips • metre sticks • measuring tapes • calculators
1.3 The Sine Law • 70 min	24–33	• BLM 1-6 Section 1.3 The Sine Law Triangles • BLM 1-7 Section 1.3 The Sine Law • BLM T-2 *The Geometer's Sketchpad®3* • BLM T-3 *The Geometer's Sketchpad®4*	• BLM 1-8 Section 1.3 Achievement Check Rubric	• *The Geometer's Sketchpad®* • computers • calculators
1.4 The Cosine Law • 70 min	34–41	• BLM 1-9 Section 1.4 The Cosine Law • BLM 1-6 Section 1.3 The Sine Law Triangles • BLM T-2 *The Geometer's Sketchpad®3* • BLM T-3 *The Geometer's Sketchpad®4*		• *The Geometer's Sketchpad®* • computers • calculators
1.5 Make Decisions Using Trigonometry • 140 min	42–51	• BLM 1-10 Section 1.5 Match Me Up Cards • BLM 1-11 Section 1.5 Make Decisions Using Trigonometry • BLM 1-13 Section 1.5 Literacy Connect	• BLM 1-12 Section 1.5 Achievement Check Rubric • BLM A-18 Opinion Piece Checklist	• calculators
Chapter 1 Review • 70 min	52–53	• BLM 1-14 Chapter 1 Review		• calculators
Chapter 1 Practice Test • 70 min	54–55		• BLM 1-15 Chapter 1 Practice Test • BLM 1-16 Chapter 1 Test	• calculators
Chapter 1 Problem Wrap-Up • 70 min	55		• BLM 1-17 Chapter 1 Problem Wrap-Up Rubric	

Chapter 1 Blackline Masters Checklist

	Title		Purpose
Chapter 1 Opener			
	BLM A-4	Presentation Checklist	Assessment
Prerequisite Skills			
	BLM 1-1	Prerequisite Skills	Practice
	BLM 1-2	Prerequisite Skills Self-Assessment Checklist	Self-Assessment
1.1 Revisit the Primary Trigonometric Ratios			
	BLM 1-3	Section 1.1 Revisit the Primary Trigonometric Ratios	Practice
	BLM T-2	*The Geometer's Sketchpad® 3*	Technology Support
	BLM T-3	*The Geometer's Sketchpad® 4*	Technology Support
1.2 Solve Problems Using Trigonometric Ratios			
	BLM 1-4	Section 1.2 Solve Problems Using Trigonometric Ratios	Practice
	BLM 1-5	Section 1.2 Make Your Own Clinometer	Student Support
1.3 The Sine Law			
	BLM 1-6	Section 1.3 The Sine Law Triangles	Student Support
	BLM 1-7	Section 1.3 The Sine Law	Practice
	BLM 1-8	Section 1.3 Achievement Check Rubric	Assessment
	BLM T-2	*The Geometer's Sketchpad® 3*	Technology Support
	BLM T-3	*The Geometer's Sketchpad® 4*	Technology Support
1.4 The Cosine Law			
	BLM 1-9	Section 1.4 The Cosine Law	Practice
	BLM 1-6	Section 1.3 The Sine Law Triangles	Student Support
	BLM T-2	*The Geometer's Sketchpad® 3*	Technology Support
	BLM T-3	*The Geometer's Sketchpad® 4*	Technology Support
1.5 Make Decisions Using Trigonometry			
	BLM 1-10	Section 1.5 Match Me Up Cards	Student Support
	BLM 1-11	Section 1.5 Make Decisions Using Trigonometry	Practice
	BLM 1-12	Section 1.5 Achievement Check Rubric	Assessment
	BLM 1-13	Section 1.5 Literacy Connect	Literacy
	BLM A-18	Opinion Piece Checklist	Assessment
Chapter 1 Review			
	BLM 1-14	Chapter 1 Review	Review
Chapter 1 Practice Test			
	BLM 1-15	Chapter 1 Practice Test	Diagnostic Assessment
	BLM 1-16	Chapter 1 Test	Summative Assessment
Chapter 1 Problem Wrap-Up Rubric			
	BLM 1-17	Chapter 1 Problem Wrap-Up Rubric	Summative Assessment

Prerequisite Skills

Student Text Pages
4–5

Suggested Timing
70 min

Tools

Related Resources
BLM 1-1 Prerequisite Skills
BLM 1-2 Prerequisite Skills Self-Assessment Checklist

Common Errors

- Some students may not solve for the square root of the variable and may leave the answer for the square.

R_x Have students complete the process.

- Students may not realize that there can be two answers to the solution of a square root.

R_x Remind students that while answers for measurement problems use only the positive square root because only positive values make sense in these situations, the negative square root is also part of the answer.

Accommodations

Memory—provide a handout with worked examples for **questions 1, 2, 4,** and **6**

Perceptual—provide diagrams for word problems

Gifted and Enrichment—have students use a road map of Canada and find as many cities as possible that are a distance of 40 km apart

Teaching Suggestions

- Have the students work in pairs. Have students write their solutions on the board and explain solutions to the class, especially questions 1 to 3, 5, and 7.
- In **question 2, part c)**, review the Pythagorean theorem and have students label the hypotenuse before solving the triangle.
- For **question 5**, have students write $\frac{\text{selling price}}{\text{purchase price}} : = \frac{18}{7} = \frac{27}{x}$ to keep track of the selling and purchase prices.
- For **question 7**, students may divide by 100 rather than 100 000. Remind students of metric conversions: 1 m = 100 cm, 1 km = 1000 m or 100 000 cm.
- For **questions 8** and **9**, remind students to round to the correct decimal place.
- All BLMs referred to throughout this chapter can be found on the *Foundations for College Mathematics 11 Teacher's Resource* CD-ROM.

Assessment

- Assess student readiness to proceed by informal observation as students are working on the questions. A formal test would be inappropriate since this material is not part of the grade 11 curriculum for this chapter.
- Student self-assessment is also an effective technique; students can place a checkmark beside topics in the Prerequisite Skills in which they feel confident with the necessary skills. Use **BLM 1-2 Prerequisite Skills Self-Assessment Checklist** as a self-assessment for students.
- Remedial action can be taken in small groups or with a whole-class skills review.

Extra Practice

- Use **BLM 1-1 Prerequisite Skills** for extra practice or remediation.

Chapter Problem

- The Chapter Problem is introduced on page 5. Have students discuss their understanding of the topic. You may wish to have students complete the Chapter Problem revisits that occur throughout the chapter. These questions are designed to help students move toward the Chapter 1 Problem Wrap-Up on page 55.
- Alternatively, you may wish to assign the Chapter Problem questions and Chapter Problem Wrap-Up when students have complete the chapter, as part of a summative assessment.