

Right Triangle Trigonometry

Strand

Measurement
and Trigonometry

Student Text Pages

42–43

Suggested Timing

20 min

Related Resources

BLM 2.CO.1 Literacy Link: KWL
Chart

Key Terms

adjacent side
angle of depression
angle of elevation
cosine ratio
hypotenuse
legs
opposite side
Pythagorean theorem
sine ratio
tangent ratio
trigonometry

Additional information and teaching materials for this chapter are available on the McGraw-Hill Ryerson web site at <http://www.mcgrawhill.ca/books/foundations10>. You will need your password to access this material.

Chapter Curriculum Specific Expectations Solving Problems Involving the Trigonometry of Right Triangles

In this chapter, students will

MT2.01 determine, through investigation (e.g., using dynamic geometry software, concrete materials), the relationship between the ratio of two sides in a right triangle and the ratio of the two corresponding sides in a similar right triangle, and define the sine, cosine, and tangent ratios

$$\left(\text{e.g., } \sin A = \frac{\text{opposite}}{\text{hypotenuse}} \right)$$

MT2.02 determine the measures of the sides and angles in right triangles, using the primary trigonometric ratios and the Pythagorean theorem

MT2.03 solve problems involving the measures of sides and angles in right triangles in real-life applications (e.g., in surveying, in navigation, in determining the height of an inaccessible object around the school), using the primary trigonometric ratios and the Pythagorean theorem

MT2.04 describe, through participation in an activity, the application of trigonometry in an occupation (e.g., research and report on how trigonometry is applied in astronomy; attend a career fair that includes a surveyor, and describe how a surveyor applies trigonometry to calculate distances; job shadow a carpenter for a few hours, and describe how a carpenter uses trigonometry)

Teaching Suggestions

Chapter Opener

- Have students read the Chapter Opener.
- Point out the triangle supports in the photograph of the bridge. Have students brainstorm other structures that use right triangles in their design (e.g., roofs, tractor-trailers that transport cars, railcars, etc.).
- Ask students to think of why right triangles might be stronger than other kinds of triangles.

Literacy Link

- You may wish to have students use **BLM 2.CO.1 Literacy Link: KWL Chart** for this activity.
- For more information on the Think Literacy program, visit <http://www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy>.

Career Profile

- Discuss the tools a carpenter uses daily. Borrow a set-square from the technology department to show to students.
- Ask students to consider why carpenters would want to form 90° angles.
- Have students look around the classroom and the school for examples of 90° angles. If the school is wheelchair accessible, have students search on the Internet for the slope required by law for wheelchair ramps. Follow up this activity by having the students measure the ramp to see if the angle is consistent with the mandated slope.
- Invite a carpenter to speak to the class.

Chapter 2 Planning Chart

Section Suggested Timing	Student Text Page(s)	Teacher's Resource Blackline Masters	Assessment	Tools
Chapter 2 Opener • 20 min	42–43	<ul style="list-style-type: none"> • BLM 2.CO.1 Literacy Link: KWL Chart 		
Get Ready! • 80–120 min	44–45	<ul style="list-style-type: none"> • BLM 2.GR.1 Practice: Get Ready 	<ul style="list-style-type: none"> • BLM 2.GR.2 Get Ready Self-Assessment Checklist 	<ul style="list-style-type: none"> • scientific calculators
2.1 The Pythagorean Theorem • 80 min	46–53	<ul style="list-style-type: none"> • BLM 2.1.1 Practice: The Pythagorean Theorem • BLM G2 Protractor • BLM G3 Centimetre Grid Paper 		<ul style="list-style-type: none"> • 1-cm grid paper • coloured paper • protractors • rulers • scissors • tape
2.2 Explore Ratio and Proportion in Right Triangles • 80 min	54–62	<ul style="list-style-type: none"> • BLM 2.2.1 Practice: Explore Ratio and Proportion in Right Triangles • BLM 2.2.2 Investigate Method 3: Use <i>Cabri Jr.</i> • BLM G1 Grid Paper • BLM G2 Protractor • BLM T1 <i>The Geometer's Sketchpad</i>® 4 		<ul style="list-style-type: none"> • calculators • computers • <i>The Geometer's Sketchpad</i>® • grid paper • protractors • rulers
2.3 The Sine and Cosine Ratios • 80 min	63–73	<ul style="list-style-type: none"> • BLM 2.3.1 Practice: The Sine and Cosine Ratios • BLM G1 Grid Paper • BLM G2 Protractor • BLM T1 <i>The Geometer's Sketchpad</i>® 4 	<ul style="list-style-type: none"> • BLM 2.3.2 Achievement Check Rubric 	<ul style="list-style-type: none"> • calculators • computers • <i>The Geometer's Sketchpad</i>® • grid paper • protractors • rulers
2.4 The Tangent Ratio • 80 min	74–82	<ul style="list-style-type: none"> • BLM 2.4.1 Practice: The Tangent Ratio • BLM G1 Grid Paper • BLM G2 Protractor 	<ul style="list-style-type: none"> • BLM 2.4.2 Achievement Check Rubric • BLM A3 Communication General Scoring Rubric 	<ul style="list-style-type: none"> • calculators • computers • <i>The Geometer's Sketchpad</i>® • grid paper • protractors • rulers
2.5 Solve Problems Using Right Triangles • 80 min	83–87	<ul style="list-style-type: none"> • BLM 2.5.1 Practice: Solve Problems Using Right Triangles • BLM G2 Protractor 	<ul style="list-style-type: none"> • BLM A1 Knowledge/Understanding General Scoring Rubric • BLM A4 Application General Scoring Rubric • BLM A6 Group Work General Scoring Rubric 	<ul style="list-style-type: none"> • drinking straw • measuring tape • paper clips • protractors • tape • thin string
Chapter 2 Review • 80 min	88–89	<ul style="list-style-type: none"> • BLM 2.CR.1 Chapter 2 Review • BLM G1 Grid Paper 		<ul style="list-style-type: none"> • scientific calculators
Chapter 2 Practice Test • 80 min	90–91	<ul style="list-style-type: none"> • BLM G1 Grid Paper 	<ul style="list-style-type: none"> • BLM 2.PT.1 Chapter 2 Practice Test • BLM 2.CT.1 Chapter 2 Test 	<ul style="list-style-type: none"> • scientific calculators
Chapter 2 Chapter Problem Wrap-Up • 30 min	91		<ul style="list-style-type: none"> • BLM 2.CP.1 Chapter 2 Problem Wrap-Up Rubric 	
Task: Fix Up a Neighbourhood • 80 min	92–93	<ul style="list-style-type: none"> • BLM G1 Grid Paper 	<ul style="list-style-type: none"> • BLM 2.T.1 Task: Fix Up a Neighbourhood Park Rubric 	<ul style="list-style-type: none"> • grid paper
Chapters 1 to 2 Review • 80 min	94–95	<ul style="list-style-type: none"> • BLM G1 Grid Paper 	<ul style="list-style-type: none"> • BLM A9 Self-Assessment Recording Sheet • BLM A16 Self-Assessment Checklist 	<ul style="list-style-type: none"> • grid paper

Chapter 2 Blackline Masters Checklist

	Title		Purpose
Chapter 2 Opener			
	BLM 2.CO.1	Literacy Link: KWL Chart	Literacy
Get Ready!			
	BLM 2.GR.1	Practice: Get Ready	Practice
	BLM 2.GR.2	Get Ready Self-Assessment Checklist	Self-Assessment
2.1 The Pythagorean Theorem			
	BLM 2.1.1	Practice: The Pythagorean Theorem	Practice
	BLM G2	Protractor	Student Support
	BLM G3	Centimetre Grid Paper	Assessment
2.2 Explore Ratio and Proportion in Right Triangles			
	BLM 2.2.1	Practice: Explore Ratio and Proportion in Right Triangles	Practice
	BLM 2.2.2	Investigate Method 3: Use <i>Cabri Jr.</i>	Extension
	BLM G1	Grid Paper	Student Support
	BLM G2	Protractor	Student Support
	BLM T1	<i>The Geometer's Sketchpad</i> ® 4	Assessment
2.3 The Sine and Cosine Ratios			
	BLM 2.3.1	Practice: The Sine and Cosine Ratios	Practice
	BLM 2.3.2	Achievement Check Rubric	Assessment
	BLM T1	<i>The Geometer's Sketchpad</i> ® 4	Technology
	BLM G1	Grid Paper	Student Support
	BLM G2	Protractor	Student Support
2.4 The Tangent Ratio			
	BLM 2.4.1	Practice: The Tangent Ratio	Practice
	BLM 2.4.2	Achievement Check Rubric	Assessment
	BLM A3	Communication General Scoring Rubric	Assessment
2.5 Solve Problems Using Right Triangles			
	BLM 2.5.1	Practice: Solve Problems Using Right Triangles	Practice
	BLM G2	Protractor	Student Support
	BLM A1	Knowledge/Understanding General Scoring Rubric	Assessment
	BLM A4	Application General Scoring Rubric	Assessment
	BLM A6	Group Work General Scoring Rubric	Assessment
Chapter 2 Review			
	BLM 2.CR.1	Chapter 2 Review	Review
	BLM G1	Grid Paper	Student Support

		Title	Purpose
Chapter 2 Practice Test			
	BLM 2.PT.1	Chapter 2 Practice Test	Diagnostic Assessment
	BLM 2.CT.1	Chapter 2 Test	Summative Assessment
	BLM G1	Grid Paper	Student Support
Chapter 2 Problem Wrap-Up			
	BLM 2.CP.1	Chapter 2 Problem Wrap-Up Rubric	Assessment
Task: Fix Up a Neighbourhood Park			
	BLM 2.T.1	Task: Fix Up a Neighbourhood Park Rubric	Assessment
	BLM G1	Grid Paper	Student Support
Chapters 1 to 2 Review			
	BLM A9	Self-Assessment Recording Sheet	Self-Assessment
	BLM A16	Self-Assessment Checklist	Self-Assessment
	BLM G1	Grid Paper	Student Support

Get Ready!

Student Text Pages

44–45

Suggested Timing

80–120 min

Tools

- scientific calculators

Related Resources

BLM 2.GR.1 Practice: Get Ready

BLM 2.GR.2 Get Ready Self-Assessment Checklist

Common Errors

- Some students may have difficulty rounding.
- R_x Have students circle the decimal place they wish to round to and then look to the right to decide whether to round up or down.

Accommodations

ESL—Have each student work with a partner and allow the use of a dictionary. Students may require extra time.

Gifted and Enrichment—Encourage students to think of situations in which they need to write proportions and solve them (e.g., in science class). Have them make a poster for the classroom with additional examples of proportions.

Teaching Suggestions

- Use the Get Ready questions as a diagnostic assessment to see where students will need help completing the work in this chapter.
- Use **BLM 2.GR.1 Practice: Get Ready** for extra practice or remediation as required.
- All BLMs referred to in this chapter can be found in the *Foundations of Mathematics 10: Teacher's Resource CD-ROM*.

Assessment

- The Get Ready questions provide an excellent form of diagnostic assessment. Use them to determine the students' preparedness to move on and to determine where remediation is necessary.
- Student self-assessment is also an effective technique; have students complete **BLM 2.GR.2 Get Ready Self-Assessment Checklist**. Alternatively, instruct students to put checkmarks beside the topics in the Get Ready Self-Assessment Checklist in which they feel confident with the necessary skills.
- Encourage students to seek assistance from you or a fellow student or to ask for remediation BLMs in the areas where they feel they need help before moving on. This is an opportunity for students to gain confidence in what they already know.

Chapter Problem

- Discuss with students any triangles they may have observed in buildings or structures in or near the school.
- Ask students if they have ever designed a structure in science or technology class to hold the greatest weight. Encourage interested students to research in the library or on the Internet to find strong structures, and to look at the types of mathematical figures used in these designs. Then, focus on the Chapter Problem and assess students' understanding of the topic. These questions have been designed to draw connections between the work in the chapter and a real-life application.
- The Chapter Problem questions are designed to help students move toward the Chapter Problem Wrap-Up. You may wish to assign these questions as students work through the sections. Alternatively, you may wish to assign the Chapter Problem questions and Chapter Problem Wrap-Up when students have completed the chapter, as part of a summative assessment.