

Richmond Public Schools  
Curriculum Framework  
*Geometry*

Strand: Triangles	
<p>G.8 The student, will solve problems, including practical problems, involving right triangles. This will include applying</p> <ul style="list-style-type: none"> <li>a) the Pythagorean Theorem and its converse;</li> <li>b) properties of special right triangles; and</li> <li>c) trigonometric ratios.</li> </ul>	
Suggested Pacing	Cognitive Demand
Second Nine Weeks	G.8
5 instructional days (including assessment)	Apply
Spiraling Down Standards	Spiraling Up Standards
<p><b>A.3</b> The student will simplify</p> <ul style="list-style-type: none"> <li>a) square roots of whole numbers and monomial algebraic expressions;</li> </ul> <p><b>8.9</b> The student will</p> <ul style="list-style-type: none"> <li>a) verify the Pythagorean Theorem; and</li> <li>b) apply the Pythagorean Theorem.</li> </ul>	N/A
Essential Questions	Common Misconceptions
<p><b>How can one determine a missing measurement of a right triangle?</b> <i>If given two sides of a right triangle and asked to solve for the missing side, then use Pythagorean Theorem.</i></p>	<ul style="list-style-type: none"> <li>• Students think that that hypotenuse is the “slanted” side. Emphasize that the hypotenuse always is opposite of the right angle. Use right triangles oriented differently so that students can understand that it is not always the “slanted” side.</li> </ul>

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*If given two sides of a right triangle and asked to solve for one of the acute angles, then use inverse trigonometry.*  
*If given a side and an acute angle and asked to solve for a missing side, then use trigonometry.*

**How can one verify that a triangle is a right triangle?**  
*Using Pythagorean Theorem, if  $a^2 + b^2$  is equal to  $c^2$ , then the given measurements form a right triangle.*

**What is a trigonometric ratio?**  
*The quotient of the lengths of two sides.*  
*Sine is the ratio of the side opposite an acute angle to the hypotenuse.*  
*Cosine is the ratio of the side adjacent an acute angle to the hypotenuse.*  
*Tangent is the ratio of the side opposite an acute angle to the adjacent side.*

**What is the relationship between sine and cosine in terms of complementary angles?**  
*The sine of one acute angle in a right triangle and cosine of its complement are equal.*

- The opposite side and adjacent side can be mixed up. Emphasize what was discussed in similar triangles that the opposite side is across from the referenced acute angle.

Understanding the Standard	Essential Knowledge and Skills
<ul style="list-style-type: none"> <li>• The converse of the Pythagorean Theorem can be used to determine if a triangle is a right triangle.</li> <li>• <math>45^\circ</math>-<math>45^\circ</math>-<math>90^\circ</math> and <math>30^\circ</math>-<math>60^\circ</math>-<math>90^\circ</math> triangles are special right triangles because their side lengths can be specified as exact values using radical rather than decimal approximations.</li> </ul>	<p><b>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</b></p> <ul style="list-style-type: none"> <li>• Solve problems, including practical problems, using right triangle trigonometry and properties of special right triangles (a, b, c)</li> </ul>

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<ul style="list-style-type: none"> <li>• The sine of an acute angle in a right triangle is equal to the cosine of its complement.</li> </ul>	<ul style="list-style-type: none"> <li>• Determine whether a triangle formed with three given lengths is a right triangle. (a)</li> <li>• Solve for missing lengths in geometric figures, using properties of 45°-45°-90° triangles where rationalizing denominators may be necessary. (b)</li> <li>• Solve for missing lengths in geometric figures, using properties of 30°-60°-90° triangles where rationalizing denominators may be necessary. (b)</li> <li>• Solve problems, including practical problems, involving right triangles with missing side lengths or angle measurements, using sine, cosine, and tangent ratios. (c)</li> </ul>
<b>Vocabulary</b>	
Angle of Depression	Angle of Elevation
Sine	Cosine
Pythagorean Theorem	30°-60°-90° triangle
Trigonometry	
	Right Triangle
	Tangent
	45°-45°-90° triangle
<b>Assessment</b>	
<ol style="list-style-type: none"> <li>1. Powerschool Assessment G.8a (E: 2HXL8V) G.8b (E: 2WPLN2) G.8c (E: 1S63FF)</li> <li>2. Mulligan Checkpoint G.8 <a href="#">Checkpoint G.8</a></li> </ol>	<p><b>Instructional Activities Organized by Learning Objective</b></p> <p><b>Virginia Department of Education</b></p> <ul style="list-style-type: none"> <li>• <a href="#">The Pythagorean Relationship</a></li> <li>• <a href="#">Special Right Triangles and Right Triangle Trigonometry</a></li> </ul> <p><b>Textbook</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Geometry</a>, ©2012, Price, et al, McGraw-Hill School Education Group page(s) 541-581</li> </ul> <p><b>Notes and Homework</b></p> <ul style="list-style-type: none"> <li>• <a href="#">G.8a,b,c Notes and Keys</a></li> <li>• <a href="#">G.8a,b,c Homework and Keys</a></li> </ul> <p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• <b>Print</b></li> </ul>

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3. Formative Assessment (Paper)

[G.8a,b,c FA](#)

4. Cumulative Assessment (Semester Exam)

(SOLs G.1, G.2, G.3, G.4a-f, G.5, G.6, G.7, G.8)

[Semester Exam](#)

- Coach book, Virginia edition, Lesson 17-19 page(s) 138-158

- **Technology**

- **Gizmo**
  - [Sine, Cosine and Tangent Ratios](#)
- **Geogebra**
  - [Pythagorean Exploration and Proof Activities](#)
  - [Exploring Special Right Triangles](#)
  - [Right Triangle Trigonometry Explorations](#)
- **Mathwarehouse**
  - [Right Triangle Trigonometry Lesson](#)
- **Desmos**
  - [Pythagorean Theorem Activities](#)
  - [Special Right Triangles Activities](#)
- **Youtube Videos**
  - [Pythagorean Theorem \(Math Antics\)](#)
  - [Scarecrow incorrectly recites Pythagorean Thm. \(Math in Movies\)](#)
  - [Who Wants to be a Millionaire Math Blunder](#)
  - [Homer Simpson and the Pythagorean Theorem?](#)
  - [Special Right Triangles \(examples\)](#)
  - [Gettin' Triggy wit' it](#)
  - [Trigonometry word problems \(Mashup Math\)](#)
- **Quizizz Practice**
  - [G.8a Practice](#)
  - [G.8b Practice](#)
  - [G.8c Practice](#)

**Instructional Activities**

[Pythagorean Theorem and Converse](#)  
[Special Right Triangles](#)

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Cross-Curricular Connections	SOHCAHTOA Tiered Interventions
<p><b>Real World:</b> Surveyors, City Planners, Skiers, Geologists, Foresters, Sailors, Meteorologists, Engineers, Judges, all use right triangles in their fields.</p> <p><a href="#">Conch Shell Project Questions</a> <a href="#">Conch Shell Project Instructions</a></p> <p><a href="#">Trigonometry Project</a> <a href="#">Sample Student Trigonometry Stories</a></p>	<p><b>Tier 3: Recall and Reproduction</b> Vocabulary Have students study flashcards, create their own flashcards, play a matching game or test themselves on Quizlet. <a href="#">Right Triangles Flashcards on Quizlet</a></p> <p>Students may benefit from creating a graphic organizer or reference card for solving right triangles using trigonometry. <a href="#">Reference Cards for using Right Triangle Trigonometry</a> Link to blog with interactive notebook foldables to help with special right triangles: <a href="#">Special Right Triangles</a></p> <p><b>Tier 2: Basic Skills and Concepts</b> Practice and Drill <a href="#">Right Triangles Drills</a> <a href="#">G.8 SOL Practice problems</a></p> <p>Have students sort according to solving by using sin, cos, or tan. Then explain their reasoning to a partner. <a href="#">SOHCAHTOA problems sort</a></p> <p><b>Tier 1: Strategic Thinking and Reasoning</b> Application Have students create story problems as to when they would use a clinometer, illustrate, and solve the problem on a poster. Then have a gallery walk to display and discuss the problems.</p>

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