

**Richmond Public Schools**  
Curriculum Framework  
Grade 8

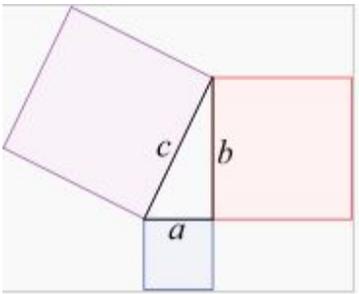
Strand: Measurement and Geometry	
8.9 The student will a) verify the Pythagorean Theorem; and b) apply the Pythagorean Theorem.	
Suggested Pacing	
Second Nine Weeks – 9 Instructional Days (including common assessment)	
Related Standards	
<b>Spiral Down</b> 7.1 The student will d) determine square roots of perfect squares.  6.4 The student will recognize and represent patterns with whole number exponents and perfect squares.	<b>Spiral Up</b> <b>G.8</b> The student will solve problems, including practical problems, involving right triangles. This will include applying a) the Pythagorean Theorem and its converse.
Essential Questions	Common Misconceptions
<b>How can the area of squares generated by the legs and the hypotenuse of a right triangle be used to verify the Pythagorean Theorem?</b> <i>For a right triangle, the area of a square with one side equal to the measure of the hypotenuse equals to the sum of the areas of the square with one sides equal to the measures of each of the legs of the triangle.</i>	<ul style="list-style-type: none"> <li>● Students have difficulty determining which side is the hypotenuse in practical problems.</li> <li>● Students often don't want to illustrate a triangle when completing a practical problem.</li> <li>● Students would benefit with practice finding the length of the hypotenuse when given points on a coordinate plane.</li> <li>● Students have trouble solving the equation for a missing side due to issue with knowing why the inverse operation of an exponent of 2 is a square root.</li> </ul>
Understanding the Standard	Essential Knowledge and Skills

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- The Pythagorean Theorem is essential for solving problems involving right triangles.
- The relationship between the sides and angles of right triangles are useful in many applied fields.
- In a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the legs. This relationship is known as the Pythagorean Theorem:  $a^2 + b^2 = c^2$ .



- The Pythagorean Theorem is used to determine the measure of any one of the three sides of a right triangle if the measures of the other two sides are known.
- The converse of the Pythagorean Theorem states that if the square of the length of the hypotenuse equals the sum of the squares of the legs in a triangle, then the triangle is a right triangle. This can be used to determine whether a triangle is a right triangle given the measures of its three sides.
- Whole number triples that are the measures of the sides of right triangles, such as (3, 4, 5), (6, 8, 10), (9, 12, 15), and (5, 12, 13), are commonly known as Pythagorean triples.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Verify the Pythagorean Theorem, using diagrams, concrete materials, and measurement. (a)
- Determine whether a triangle is a right triangle given the measures of its three sides. (b)
- Determine the measure of a side of a right triangle, given the measures of the other two sides. (b)
- Solve practical problems involving right triangles by using the Pythagorean Theorem. (b)

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<ul style="list-style-type: none"> <li>• The hypotenuse of a right triangle is the side opposite the right angle.</li> <li>• The hypotenuse of a right triangle is always the longest side of the right triangle.</li> <li>• The legs of a right triangle form the right angle.</li> </ul>	
<b>Vocabulary</b>	<b>Instructional Activities Organized by Learning Objective</b>
Pythagorean Theorem Right Triangles Right Angle Converse of the Pythagorean Theorem Hypotenuse Legs Pythagorean Triples Square Square Root Diagonal	<b>Virginia Department of Education</b> <u><a href="#">Pythagorean Theorem</a></u> – Lesson Plan  <b>Textbook</b> <i>Virginia Pre-Algebra, ©2012, Glencoe/McGraw-Hill</i> <ul style="list-style-type: none"> <li>• The Pythagorean Theorem, page(s) 581 – 587</li> </ul> <b>Notes</b> <ul style="list-style-type: none"> <li>• <a href="#">Notepage</a></li> </ul>
<b>Assessment</b>	<b>Resources</b>
RPS PowerSchool Unit Test – RPS 8.9 Common Assessment Test ID#:  <b>Formative Assessments</b> Kahoot.it Plickers Exit Tickets Graphic Organizers	<ul style="list-style-type: none"> <li>• <b>Print</b>  <i>Virginia Coach</i>, NEW SOL Edition, Grade 8, Mathematics            Lesson 13 – page 97 (The Pythagorean Theorem)</li> <li>• <b>Technology-based</b> <ul style="list-style-type: none"> <li>○ <i>Exchange.Smarttech.com (SMART Board)</i> – <u><a href="#">The Pythagorean Theorem</a></u> – Interactive SMART Lesson (slide 9 extension only)</li> <li>○ <i>BraingingCamp.com</i> – <u><a href="#">Pythagorean Theorem</a></u> – Interactive Instructional Resource (slides 4-13, 19-24, 30-32 only)</li> <li>○ <i>VirtualNerd.com</i> – <u><a href="#">What is the Pythagorean Theorem?</a></u> – Instructional Video</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"><li>○ <i>ExploreLearning.com (Gizmos) – <a href="#">Pythagorean Theorem</a> – Interactive Instructional Resource *Sign-in required</i></li></ul> <p><b>Station Activities</b></p> <ul style="list-style-type: none"><li>● Task Cards - Have students complete problems in small groups Think-Pair-Share</li><li>● Carousel - Have students walk around the class and answer questions about real numbers posted around the classroom.</li><li>● <a href="#">Foldable</a></li><li>● Prove it (<a href="#">example 1</a> and <a href="#">example 2</a>)</li><li>● Dot Card Activity (<a href="#">Directions</a> &amp; <a href="#">Activity</a>)</li><li>● <a href="#">Pythagorean Game</a></li><li>● <a href="#">Math Lib</a></li><li>● <a href="#">QR Code Practice</a></li><li>● <a href="#">Scavenger Hunt</a></li><li>● <a href="#">Tarsia Puzzle</a></li></ul>
Cross-Curricular Connections	Differentiations
<p><b>English</b> Have students explain what the Pythagorean Theorem equation means in words.</p> <p><b>History</b> Read and/or research about the history of Pythagoras.</p>	<ul style="list-style-type: none"><li>● Have students practice verify right triangles using angle legs.</li><li>● Discuss similar figures and scale factor with students, then have students draw a 3, 4, 5 right triangle and make similar triangles.</li><li>● Have students highlight the legs and the hypotenuse different colors.</li><li>● Have students use a graphic organizer for problem solving.</li><li>● Have students think of situations where knowing the hypotenuse is necessary.</li></ul>