**Unit Abstract:**

This unit will focus on connecting algebraic concepts to geometry while focusing on the use of the Pythagorean Theorem to solve real-world problems. Students will further apply their knowledge from the previous unit such as square roots and exponents.

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| * **Overarching Question:**  How can algebraic concepts be applied to geometry? | | | | | | |
|  | | **This Unit:** Pythagorean Theorem, Distance in the Coordinate Plane | | | |  |
| **Questions to Focus Assessment and Instruction:**   * How can you prove that the Pythagorean Theorem is true? * How do you find any side in a right triangle given the lengths of the other two sides? * How can you prove the Converse of the Pythagorean Theorem? * How do you calculate the distance between two points in the coordinate plane? | | | | **Standards for Mathematical Practice**  1.Make sense of problems and persevere in solving them.  **2.Reason abstractly and quantitatively.**  **3.Construct viable arguments and critique the reasoning of others.**  **4.Model with mathematics.**  5.Use appropriate tools strategically.  6.Attend to precision.  7.Look for and make use of structure.  8.Look for and express regularity in repeated reasoning. | | |
| **Academic Vocabulary**  *(5-8 most important content specific vocabulary words)* | Hypotenuse  Leg  Pythagorean Theorem  Pythagorean Triples  Proof  Converse | |  | |  | |

| **Standards** | **Learning Targets** *(including relevant practice standards)* | **Explanations and Examples\*** | **Assured Experiences**  *(common assessments and learning activities)* |
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| 7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.  7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.  **7.EE.4 (emphasis on a) Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.**   1. **Solve word problems leading to equations of the form *px + q = r* and *p(x + q) = r,* where *p, q, and r* are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.** 2. **Solve word problems leading to equations of the form *px + q > r or px + q < r,* where *p, q, and r* are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.**   8.G.6 Explain a proof of the Pythagorean Theorem and its converse. MP3 Construct viable arguments and critique the reasoning of others. MP2 Reason abstractly and quantitatively.  **8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.**  MP2 Reason abstractly and quantitatively. (contextualize/decontextualize)  MP4 Model with Mathematics  8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. | Students will….  Students will be able to identify the legs and hypotenuse of a right triangle.  Students will describe the relationship among the sides of a right triangle.  Student will justify that a triangle is classified as right by the Converse of the Pythagorean Theorem.  Students will use the Pythagorean Theorem to find the length of a missing side of a right triangle.  Students will apply the Pythagorean Theorem in two and three dimensions.  Students will apply the Pythagorean Theorem to find the distance between two points in a coordinate plane. | From state document | * common assessment * learning activity:   Inquiry Lab  Similar to  <http://map.mathshell.org/download.php?fileid=1698>  **Jane’s TV** <http://map.mathshell.org/materials/download.php?fileid=1098>  **Hopewell Geometry** <http://map.mathshell.org/materials/tasks.php?taskid=127&subpage=apprentice>  **Proofs of the Pythagorean Theorem?** <http://map.mathshell.org/materials/tasks.php?taskid=276#task276>  **Pythagorean Triples** <http://map.mathshell.org/materials/tasks.php?taskid=280#task280>  Spiderbox  <https://www.illustrativemathematics.org/content-standards/tasks/1699>  <http://threeacts.mrmeyer.com/tacocart/>  <http://insidemathematics.org/index.php/mathematical-content-standards>  Finding perimeter of a triangle that is not a right triangle given the coordinates points. |

**Instructional resources** (including manipulatives, literature connections, professional resources)

Standard #1

Standard #2

Standard #3

Standard #4

Standard #5