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| **Synopsis of high-quality task:**  Students will use different size squares to discover which square areas create acute, right, and/or obtuse triangles.  **Anticipated student time spent on task:** 1 or 2 Classes (about 45 mins each class)  **Student task structure(s):** Partner or small group work |
| [**Math Content Standards and Practices:**](http://www.doe.mass.edu/frameworks/math/2017-06.pdf)  **8.G.B** Understand and apply the Pythagorean Theorem.  **8.G.B.6.a** Understand the relationship among the sides of a right triangle.  **8.G.B.6.b** Analyze and justify the Pythagorean Theorem and its converse using pictures, diagrams, narratives, or models.  **SMP 1** Make sense of problems and persevere in solving them.  **SMP 6** Attend to precision.  **SMP 8** Look for and express regularity in repeated reasoning. |
| **Prior Knowledge:**  **3.MD.C.5.a** A square with side length one unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.  **4.G.A.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.  **6.G.A.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.  **8.EE.A.2** Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3= p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. |
| **Connections to the real-world:**  Architecture, Construction, Navigation, Surveying, Planning a Road Trip and Routes, Painting, Size of a TV |
| **Mastery Goals:**  **Learning Objective:**  Students will be able to understand the relationships among the sides of a right triangle.  **Language Objective:**  Students will explain patterns they noticed when looking at the side lengths and areas of the squares that form different types of triangles. |
| **Teacher instructions**  **Instructional Tips/Strategies/Suggestions:**   1. Print a set of perfect squares on cardstock for each pair or group. 2. Print copies of the worksheet. 3. In order to prepare the classroom, each group must have a set of perfect squares, worksheets for each student, paper for sketching, and protractors and/or angle rulers. 4. As students arrive, place them in groups. 5. Introduce the activity and allow students to explore. 6. Lead a class discussion to uncover their discoveries. |
| **Instructional Materials/Resources/Tools:**   * Set of perfect squares on cardstock (Materials: Set of squares labeled with areas: 1u2, 2.25u2, 4u2, 6.25u2, 9u2, 12.25u2, 16u2, 25u2) * Extra paper for sketching * Pencils * Protractor or angle ruler * See attached worksheet. |
| **Accessibility and Supports:**  **Potential sentence starters**:  I noticed…...because….  When an acute triangle was formed, I noticed…  When a right triangle was formed, I noticed…  When an obtuse triangle was formed, I noticed...  **Key academic vocabulary**: Perfect square(s), sides, vertices, acute triangle, scalene triangle, obtuse triangle, hypotenuse, legs, right angle |

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Instructions:

1. Using three different size squares, connect their vertices to create a triangle.
2. Record the information of the three squares and the type of triangle that they create in the table below.

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| Square Small  Side length  (units) | Square Med.  Side length  (units) | Square Large  Side length  (units) | Square Small  Area  (sq. units) | Square Med.  Area  (sq. units) | Square Large  Area  (sq. units) | Type of Triangle |
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1. Sort your data into the three different types of triangles: Right, Acute and Obtuse

Right Triangles:

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| Square Small  Side length  (units) | Square Med.  Side length  (units) | Square Large  Side length  (units) | Square Small  Area  (sq. units) | Square Med.  Area  (sq. units) | Square Large  Area  (sq. units) | Type of Triangle |
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4. What pattern do you notice for Right Triangles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Acute Triangles:

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| Square Small  Side length  (units) | Square Med.  Side length  (units) | Square Large  Side length  (units) | Square Small  Area  (sq. units) | Square Med.  Area  (sq. units) | Square Large  Area  (sq. units) | Type of Triangle |
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1. What pattern do you notice for Acute Triangles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Obtuse Triangles:

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| Square Small  Side length  (units) | Square Med.  Side length  (units) | Square Large  Side length  (units) | Square Small  Area  (sq. units) | Square Med.  Area  (sq. units) | Square Large  Area  (sq. units) | Type of Triangle |
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1. What pattern do you notice for Obtuse Triangles?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
     
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| **Sample Student Work:**  **Student Work. Shows a table with small, medium and large side lengths and area, as well as the type of triangle that it is (obtuse, acute or right)Student work showing numbers 3, 4, 5 and 6. Number 3 includes tables categorizing triangles into right, obtuse or acute, as well as the dimensions of each triangle. Number 4: "The two smaller sides, once squared, equal the bigger line when squared." Number 5: "The two shorter lines, once squared and added, are greater than the long line." Number 6: "When the two shorter lines are squares and added together, they equal a greater number than the longer line."** |