Domain: __Geometry__ **Standard Code:** __6G1__ **Teacher Name:** __Julie, Garrett__

Adapted from: Smith, Margaret Schwan, Victoria Bill, and Elizabeth K. Hughes. "Thinking Through a Lesson Protocol: Successfully Implementing High-Level Tasks."
Mathematics Teaching in the Middle School 14 (October 2008): 132-138.

PART 1: SELECTING AND SETTING UP A MATHEMATICAL TASK	
What are your mathematical goals for the lesson? (i.e., what do you want students to know and understand about mathematics as a result of this lesson?)	Find the area of right triangles by composing into rectangles
• What are your expectations for students as they work on and complete this task? • What resources or tools will students have to use in their work that will give them entry into, and help them reason through, the task? • How will the students work— independently, in small groups, or in pairs—to explore this task? • How will students record and report their work?	• Students will be actively engaged in solving the task using appropriate actions and voice level. • Graph paper Rulers Paper tiles or paper that can be used to make tiles Pencils/pens/markers Scissors • Students will explore in pairs • Students will record work in math notebooks or loose paper. Work will be reported by showing notes under a document camera or producing a small poster
How will you introduce students to the activity so as to provide access to *all* students while maintaining the cognitive demands of the task?	Talk about being able to create your own space like on TLC's of HGTV's home makeover shows. Talk about the math that is involved in deciding how much material to use or purchase. Read task as a class Video of carpet tiles: http://www.flor.com/what-is-flor Review the concept of "area"

PART 2: SUPPORTING STUDENTS' EXPLORATION OF THE TASK	
As students work independently or in small groups, what questions will you ask to— • help a group get started or make progress on the task? • focus students' thinking on the key mathematical ideas in the task? • assess students' understanding of key mathematical ideas, problem-solving strategies, or the representations? • advance students' understanding of the mathematical ideas?	• What have you discovered so far? What information do you already have? • What are you trying to find? What do you already know about area? • What tools can you use to help you? Have you done any problems that are similar to this? • What other topics could you compare/relate this to?
How will you ensure that students remain engaged in the task? • What assistance will you give or what questions will you ask a student (or group) who becomes quickly frustrated and requests more direction and guidance is solving the task? • What will you do if a student (or group) finishes the task almost immediately? How will you extend the task so as to provide additional challenge?	• What tools could you use? Could you draw a picture or act out the problem? Could you try a simpler problem? • Have students find the cost of the carpet tiles or paint using the following sites: http://www.flor.com/ http://www.lowes.com http://www.homedepot.com/ Find areas of other polygon-shaped rooms Repeat the task with different dimensions—what other dimensions for a room would work for the tiles given?

PART 3: SHARING AND DISCUSSING THE TASK

How will you orchestrate the class discussion so that you accomplish your mathematical goals?
- Which solution paths do you want to have shared during the class discussion? In what order will the solutions be presented? Why?
- What specific questions will you ask so that students will—
  1. make sense of the mathematical ideas that you want them to learn?
  2. expand on, debate, and question the solutions being shared?
  3. make connections among the different strategies that are presented?
  4. look for patterns?
  5. begin to form generalizations?

What will you see or hear that lets you know that *all* students in the class understand the mathematical ideas that you intended for them to learn?

- Any solutions that were drawn or represented by shapes that were cut out should be shown first as they will be very literal to what the task is asking about. Next, any figures that are shown to represent or break down the dimensions that were given. The last solutions to be shown will be the ones that used the algorithm or formula as this will be used to connect the student drawings or representations to the formula.

- Questions:
1. Where did you get the information you are using? How does it relate to each other?

2. How can you use your solution to answer similar tasks with different dimensions or shapes? If two groups solutions or answers differ, compare/contrast and ask students why the groups may have thought to do it the other way. How could we do this differently?

3. How can you see your solution/procedure in another group's representation?

4. How do all of these techniques relate? What do we see over and over throughout our procedures? What about the tiles on the diagonal/hypotenuse of the triangle, what did you do to them; relate to the larger triangle.

5. What can we say about finding the area of triangles based on what we have observed and done today? How can we relate finding area using both square and rectangular tiles?

- Students will talk about length and width and how they relate, multiplication, having to "cut" rectangles in half, and relating the smaller rectangles that would be cut in half to the larger triangle of the room.