Domain: Geometry **Standard Code: 6 G 1** **Teacher Name: Doug Merilee Annette Johanna**

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?)	Students will be able to compute the area of triangles and quadrilaterals.
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?	Possible Materials Needed: • graph paper - blueprint • glue • tape • scissors • journal • chart Students will work in small groups. • Journal – needs to show: 1. The exterior surface area of each component Students will present their Wacky Playhouses to whole class.
How will you introduce students to the activity so as to provide access to *all* students while maintaining the cognitive demands of the task?	Launch: *Wacky Playhouse ppt*. Personal connections to blanket playhouses you made as a kid. • Forts • Treehouses • Playhouses

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?	Questions to prompt: 1. What pre-knowledge do you need to do this task? • How is finding the area of a right triangle different from finding the area of other triangles? • Need to be able to find the area of a triangle and of a rectangle. To assess: That they are following the criteria explained. That they correctly finding the areas of the components. To advance students' understanding: application of the concepts, real world exploration by going abstract to concrete. Some students can figure out surface area as they are creating and others might figure it out at the end.
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?	Expectations are in place 1. Positive reinforcements 2. General Questioning 3. In the middle of task, bring whole group back to briefly discuss project. 4. Controlled voice level. They have figured out the surface area on the outside, now they need to determine the surface area for painting and flooring the inside. When that has been completed now they can determine the volume.

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?	Share student work in this order, if available: 1. Each group needs to show their playhouse and explain the design. 2. Charts should show the equation and the area of each component. • Each equation needs to be totaled at the bottom of each component. 3. Explain if it is any different than the total and why? 4. Each equation needs to be totaled at the bottom of each component. Questions to use during share: 1. Did they change blueprints throughout the process? 2. Did you reject any component shape because you did not know how to figure out the surface area? 3. Did only choose component shapes that were easy to compute the surface areas? 4. If you had a group like that you can pair those groups with others that did not do that.

Wacky Playhouse

You want to make a *Wacky Playhouse*. Your Dad has given you 8 sheets of plywood that measure 4 ft. by 8 ft. He has stated that you have to use all of the plywood to make your *Wacky Playhouse*. He doesn't want anything left over. He has also given you specific criteria in building your Wacky Playhouse.

Task 1

- Calculate the total surface area of the 8 sheets of plywood.

Task 2

- Draw each component using graph paper.
- Design your playhouse with the following criteria:
    1. In your design you need to use at least 3 triangles.
    2. In your design you need to use at least 3 rectangles.
    3. In your design you need to use at least 3 squares.
    4. In your design you need to use at least 3 quadrilaterals that are not rectangles.
- You now need to compute the surface area of each component and the sum of the areas on the chart paper provided.

TASK 3

- Put your components together to make your Wacky Playhouse
- Is there any difference to the outside area of the playhouse from your total in Task 2?
- Is there any difference to the outside area of the playhouse from your total in Task 1?