**Domain: EE Standard Code: 4 Teacher Name: Diane Schultz**

Adapted from: Smith, Margaret Schwan, Victoria Bill, and Elizabeth K. Hughes. “Thinking Through a Lesson Protocol: Successfully Implementing High-Level Tasks.”

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| **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 identify when two expressions are equivalent. That is they name the same number regardless of what value is substituted into them. Example: y + y + y = 3y because no matter what number replaces y the equation is equal.  Students will be using pattern blocks and working toward creating expressions that are equal using variable and constant values. |
| * 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 understand the value of each shape in the pattern blocks. Students will be able to make both sides of a balance equal.  Students will need pattern blocks and journals.  Students will work with their partner or in a triad.  Students will record their work in their journals. |
| How will you introduce students to the activity so as to provide access to *all*  students while maintaining the cognitive demands of the task? | Let the students know that they will be creating patterns with any color or shape of block and then creating another pattern using different color and shapes that covers the exact same area. Students will record their data in their journals. |

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| **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 do you already know?  Why did you choose this method?  What does this represent?  What do you think the next step is?  Can you represent this in a different way?  How can you justify your solutions?  Can you write a mathematical expression to show your combination?  How will you represent the different colors or shapes? |
| 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 in  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? | If a student is stuck, they can refer to their journals for more information, or they can join another group and monitor what they are doing.  How does the other group compare to what you are doing? How does it help?  The teacher can ask redirecting questions if necessary.  For students that finish the task quickly, ask them how they can change their combinations and how it changes the outcome. |

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| **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? | Start by having students with simple solutions share first. Build up to the more complex solutions or combinations. You want to make sure there are a variety of solutions to share. Be sure to connect vocabulary to the explanations of students.  Do you want to write yellow each time? Do you see that in equations you see in a textbook? Why not? What is a better way to express the word yellow in the expression? Can you do this for each color or shape?  Ask students to show a thumbs up or down to show if they agree with their classmate’s solution. Have them justify their choice.  Let students make charts with their solutions, and share them so that they can compare and make generalizations about the different solutions.  Students will be actively engaged in the task. You will hear talk about their solutions, you will see the results. |

**Task 1**

You have different colors and sizes of pattern blocks. How many ways can you combine the different blocks to make each combination equal in its area. (Ex. How many green triangles does it take to make a hexagon?) Record your combinations in your journal.

**Task 2**

Look for patterns in your records. How would you represent it on paper using values.