***Lesson Plan Template***

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

*Mathematics Teaching in the Middle School 14* (October 2008): 132-138.

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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?) | Interpret and compute quotients of fractions using models and representations of the problem. |
| 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?   * How will students record and report their work? | \*Students will complete the task using fraction bars, circles, or other manipulatives/models and/or precise pictures. (proportionally correct) They may use whatever tools they choose (rulers, manipulatives, graph paper, centimeter cubes, a scale, etc.)  \*Students will work independently to begin with (for #1-2) and then in pairs or small groups of 3-4 for the remainder of the task.  Students will record all of their explorations/thinking, even if they determine it is wrong. THERE IS NO ERASING; just keep going. If they use manipulatives to solve they need to trace what they used or draw a representation of what they created as a record of their thinking.  \*Students will report after the majority has solved #2. #1-2 should be discussed at this time to ensure correct understanding and redirection of any misconceptions must be addressed before they see a quotient with a remainder. |
| How will you introduce students to the activity so as to provide access to *all*  students while maintaining the cognitive demands of the task? | \*Students will be given the task sheet and may continue to move at their own group pace so that they are working at an individualized level of cognitive demand. However, ensure that all groups stop and listen when presentations/reports are given throughout the task by another student. Be very explicit about the fact that they can edit any of their work, change any of their answers, or clarify any of their representations after a session of presentations. |

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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? | \*To prompt a student to begin you may ask, “What part/s do you already know?” “What would you draw to represent that?” “What can you draw?” “How would you represent that fraction?”  \*Focus students’ thinking on the fact that they are being asked how many bags they can fill, and therefore their answer should represent the number of bags that can actually be filled. Whether their quotient is a whole number, a fraction, or a mixed number this fact does not change. IT IS NOT how many pounds or how many jelly beans.  \*Assess students understanding of this concept using their records/representations and asking them to explain/justify their solutions.  \*Advance students understanding by asking them: “Were there any jelly beans left over?” “Why/why not?” “Are there any other size bags you could use and not have any left over?” If there is a remainder, “What size bags would you need to use in order for your quotient to be a whole number?” “How much are left over and how do you know?” “Does the left over amount represent a fraction of the jelly beans you started with? A fraction of a pound? A fraction of a bag? How do you know?” “Can you solve it a different way and do your answers match?” |
| 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? | \*If a student becomes frustrated or requires guidance you may want to say to them, “Show me \_\_\_\_\_\_\_\_.” “Will you explain\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to me?” “Why did you do this/\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?” “How could you show me\_\_\_\_\_\_\_\_\_\_\_\_?” “Could you explain this drawing to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?”  \* Extensions are provided on the task sheet for early finishers. |

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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? | \*Show solutions on #1 with and without equivalent pieces/slices/bags/other representations. Question the students, “Does it matter if all the parts are/are not represented equally? (the denominator of the fraction)” “Why or why not?”  Ensure that the students are proportionally correct in their representations/drawings or they may come up with an answer that is correct, but not interpreted correctly because of their incorrect proportions (not equal w/in the same fraction or not proportionate with the next fraction) that “look” like a different answer. For example a picture of a ½ lb. should be ½ the size of their picture of 1 lb, etc.  \*Repeat questions in part 2 as necessary throughout class sharing sessions, especially on #3 and 4 where there will be a remainder. The goal is for the students to understand that they are figuring out how many bags they can fill, and therefore a remainder to the quotient in fraction form is a fraction of a bag they can fill. For example, on #3 students will come up with 3 1/8 and 3 ½. 1/8 represents how many pounds of jelly beans are left over, but that is NOT what the task is asking. ½ of a ¼ bag is what could be filled up with the left over 1/8 lb of jelly beans and therefore 3 ½ bags could be filled, which correctly answers the question in the task.  \*Focusing on #3-4, students need to determine how much is left over, what it represents, and be able to compare them correctly. |