**Domain: Number Systems Standard Code: NS1 Teacher Name: C. Price, C. Stevens, L. Everson, K. Bockholt**

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 divide a fraction by a fraction with a remainder and be able to explain what the remainder represents. |
| * 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? | Materials   * Graph paper * Fraction Pattern Blocks * Colored pencils * Journals   Resources:   * See attached lesson for direct instruction, if needed.   Students work with a partner to complete task by discussing and showing different models to represent the task. After debrief/discussion, students will journal independently. |
| How will you introduce students to the activity so as to provide access to *all*  students while maintaining the cognitive demands of the task? | We have some leftover pizza and want to share with our friends.  TASK  Big Little Italy Pizza Parlor delivered pizza to our family last night. There is 5/8 of a pizza leftover. I asked my mom if I can have some friends over to do homework and eat the remaining pizza. I want to eat 1/6 of the whole pizza, how many friends can I have over if we each get 1/6 of the pizza?  We also want to make some root beer and found some root beer extract in the cupboard. The recipe calls for ¾ cup of extract and there is 2/3 cup of extract in the bottle. How many batches of root beer can you make?  D |

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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? | Students will work with partners to solve the task.  Do NOT spoon feed the students with the answers, but ask questions to find out how students are thinking.   * Show me what you are thinking. * What does the remainder represent? * How do you know? * What does the 1/6 represent? * What does the 5/8 represent? * What does the 3/4 represent? (remainder) * Can you make a whole batch or root beer? Why. Explain your thought. |
| 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 students finish early, have students create their own tasks using division of fractions by a fraction from a real life experience.  See questions above. |

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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? | Possible student solutions:   * Bar graphs * Pizza drawings * Fraction pattern block examples   Questions   * How many friends can you invite? * How many actual people will get pizza? * What will you do with the leftover? * What does the fraction of the leftover actually mean? (There will be 3/4 of a 1/6 piece leftover.) * What does the ¾ of what? The whole pizza? The pizza left from the night before?     A BIG idea is that they will understand that the ¾ remainder is ¾ of a 1/6 piece of pizza…not the entire pizza.  The batch of root beer is NOT a full batch.  Extension: If you only have a 8/9 of the root beer extract, what would you have to do with the other ingredients in the recipe to make an 8/9 batch? |

Solve the following tasks using any method other than the standard algorithm: Be prepared to justify your answer with your chosen method.

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We also want to make some root beer and found some root beer extract in the cupboard. The recipe calls for ¾ cup of extract and there is 2/3 cup of extract in the bottle. How many batches of root beer can you make?