Domain: EE **Standard Code:** 6 **Teacher Name:** Julie Nieman, Matt Bennett, Jann Humpherys

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 understand that a variable represents an unknown number. Students will use variables to represent numbers. Students will write an expression for the given real world mathematical problems: • Write an expression to represent how much Lagoon day passes would cost for you and a friend. • Write an expression to represent how much Lagoon day passes would cost for your family. • Write an expression to represent how much Lagoon day passes would cost for taking a group of friends for a birthday party. • Extension—four of your friends have a "coke can" $5 p/ticket discount. • Extension—include your senior citizen grandma and baby sister or brother in the total cost.
• 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?	**Expectations:** That all students are engaged and on-task. **Materials/Resources/Tools:** pencils http://www.youtube.com/watch?v=fCVJaZ1zrT4 –video clip from the front seat of the roller coaster, play with volume off. link to Lagoon admissions (https://www.lagoonpark.com/servlet/OnlineSales copies of the task for students smartboard for presentation **Groups:** Students will work with partners. **Recording:** Students will record the information on their task sheet.
How will you introduce students to the activity so as to provide access to *all* students while maintaining the cognitive demands of the task?	Show the video from youtube (wicked ride) Show admissions internet site to compare prices Read over task sheet with all students Write expressions represent real life problems (stated above)

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?	Get started: Where will you find tickets prices? Is there a difference in prices of single day tickets? (age difference in prices) Could you show this information in a graph, table, or diagram? Vocabulary questions (encourage proper vocabulary): How will you represent the number of tickets purchased? (variables) How will you represent the amount each ticket costs? (coefficients) How will you represent an amount that remains the same or is constant? (constant) How did you know which operation to choose? Why did you choose that particular operation? Did you see a pattern as you increased the number of tickets sold? How could you show your results visually? Extension: How can you show $5 less per ticket on only some tickets?
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?	Move around spending not too much time at one group. Share ideas from other groups if needed. Be aware of on task or off task groups. Suggest other tools. Include all group members in questioning. Encourage sharing of ideas between group members before moving from question to question. Extension: Adjust the data, repeat the process compare results.

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?	(Mid debrief to keep students' thinking correctly) Pick students who showed a very basic and correct understanding first, then move to students who have a more complex understanding. Pick students who were not the natural leaders in the group. Vocabulary: Which number is unknown and changes or varies? (variable) Which number increased with every ticket sold? (coefficient) Which number remains the same or is constant? (constant) How did you know which operation(s) to choose? Did you see a pattern as you increased the number of tickets sold? How could you show your results visually?

Name(s)_____

EE6
Students will understand that a variable represents an unknown number.
Students will use variables to represent numbers.
Students will write an expression for the given real world mathematical problems:

LET'S GO TO LAGOON!

It's a beautiful day for playing! You're tired of the video games. You have a ride to Farmington…so plan a day at Lagoon!!!!
Lagoon website: https://www.lagoonpark.com

- Write an expression to represent how much Lagoon day passes would cost for you and a friend.

- Write an expression to represent how much Lagoon day passes would cost for your family.

- Write an expression to represent how much Lagoon day passes would cost for taking a group of friends for a birthday party.

- Extension—four of your friends have a "coke can" $5 p/ticket discount.

- Extension—include your senior citizen grandma and baby sister or brother in the total cost.