***Lesson Plan Template for\_\_\_\_\_\_\_\_\_SP4*** ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

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.

|  |  |
| --- | --- |
| **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?) | **LAUNCH:**  **Student Background Needed:**   1. Students have already been introduced to Box-and-Whisker Plots and have had instruction and experience in constructing box plots. 2. Students already know how to line up the data in order to find the median of the data. 3. Students are familiar with vocabulary of Box-and-Whisker Plots, median, first quartile, second quartile, third quartile, fourth quartile, Box plot, upper endpoint, lower endpoint,interquartile range, upper quartile, lower quartile. 4. Students have experienced setting up an accurate and useable number line with correct labels.   **Mathematical goals for the lesson:**   1. Students will understand the decisions that must be made in order to create a useable data display in a box plot. 2. Students will create a box-and-whisker (box plot). 3. Students will construct a box plot above an accurate and useable number line with correct labels. 4. Students will be able to identify the parts of a box plot using the correct vocabulary. |
| 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 for students as they work on and complete this task:**   1. Students will have blank or lined paper, graph paper, pencils, and rulers to reason through and complete the task. 2. Students will work independently for three to five minutes, and then work with a partner to continue to explore this task. 3. Students will record their work on a piece of paper or graph paper, and record in their math journal. If asked to share, the document camera will be used. |
| How will you introduce students to the activity so as to provide access to *all*  students while maintaining the cognitive demands of the task? | Before introducing the task, the class will review a previous box-and-whisker plot and review vocabulary so as to provide access to all students while maintaining the cognitive demands of the task. |

|  |  |
| --- | --- |
| **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 and strategies to help students get started or make progress.**   1. Is your center the mean or median? 2. How did you get your median? 3. Why does your box-and-whisker plot look like this? 4. Explain your quartiles. 5. How does your plot vary? 6. What do your whiskers represent? 7. What does your plot tell you about the Butterfingers sold? 8. Describe the overall pattern. |
| 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? | **How to ensure that students remain focused and engaged in the task**   1. Look at your math journal. What was it we did? Lets review your steps. 2. What does median mean? Or How do you find the median?   Etc.  **Finish Early or possible extentions:**   1. What other questions can you ask that you can solve using your plot? 2. Try displaying the data in a histogram or a dot plot. What are the advantages of using a histogram, dot plot and box plot? What are the disadvantages of using these different types of graphs? 3. Write a few questions your classmate can answer about your box-and-whisker plot. 4. What if the number of Butterfinger candy bars sold during the 8th and 9th week each increased by five. How would that change your plot? Construct a new box plot to show your changes. 5. If butterfingers came in a box of 25, how long would a box last? 6. How many boxes of butterfingers should we buy to last the entire quarter? 7. Take data of other kinds of candy bars and compare the box plots. |

|  |  |
| --- | --- |
| **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? | **Debrief: The Sharing and Discussing the Task:**  **Solution paths:**   1. Have students show particular parts of the box plot under the document camera: 2. A correctly drawn number line 3. Vocabulary aspects- many options to choose from/coach the use of correct vocabulary: Box-and Whisker Plot, median, first quartile, second quartile, third quartile, fourth quartile, Box plot, upper endpoint, lower endpoin, interquartile range, upper quartile, lower quartile. 4. Information learned from the box plot 5. Explanation – what do the whiskers represent? 6. What do the numbers mean? 7. What is the interquartile range of the box plot? What does this say about how many Butterfingers should be available to sell? 8. How many candy bars should be available every nine weeks for purchase based on your data? 9. Have a student explain what another student shared.   **What will you see or hear that lets you know that all students in the class understand?**   1. Students asking questions 2. Students observing others’ work 3. Students coming up with extensions and connected learning. |

How many of you buy a candy bar sometimes? How many of you prefer a certain candy bar? Ephraim Middle school student council sells candy bars two days per week. The sixth grade student officers keep track of the kinds of candy bars and the number sold each week. During the first nine weeks of the school year, they sold 8, 10, 9, 7, 6, 9, 9, 4, and 4 Butterfinger candy bars. Display the data of the Butterfinger candy bars sold in the first 9 weeks of school in a box-and-whisker plot.