

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.

**\*\*\* Note: students need to have prior experience with constructing box plots, histograms, and dot plots.**

| <b>PART 1: SELECTING AND SETTING UP A MATHEMATICAL TASK</b>  |  |
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| <p>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?)</p>   | <p>Students will be able to find the mean, median, and range of a set of data as well as describe the overall patterns and striking deviations on a graph.</p>   |
| <p>What are your expectations for students as they work on and complete this task?</p> <ul style="list-style-type: none"> <li>• 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?</li> <li>• How will the students work— independently, in small groups, or in pairs—to explore this task?</li> <li>• How will students record and report their work?</li> </ul> | <p>Possible Materials Needed:</p> <ul style="list-style-type: none"> <li>• Sticky notes</li> <li>• Chart paper (6-7)</li> <li>• movie clips of Toy Story 3 <a href="http://www.metacafe.com/topics/toy_story_3/">http://www.metacafe.com/topics/toy_story_3/</a> , Transformers <a href="http://www.metacafe.com/watch/6656658/transformers_trailer/">http://www.metacafe.com/watch/6656658/transformers_trailer/</a> , Despicable Me <a href="http://www.metacafe.com/watch/4357041/despicable_me_movie_trailer_2/">http://www.metacafe.com/watch/4357041/despicable_me_movie_trailer_2/</a></li> <li>• task sheet (see attached)</li> <li>• math journal for each student</li> <li>• calculators (optional)</li> <li>• box office mojo link (in case students want to research further for their movies) <a href="http://www.boxofficemojo.com">www.boxofficemojo.com</a></li> </ul> <p>Students will work in partners for number 1 and in small groups for number 2</p> |
| <p>How will you introduce students to the activity so as to provide access to <i>all</i> students while maintaining the cognitive demands of the task?</p>   | <p><u>Hook:</u><br/>Tell students that they are going to choose one movie that they would like to attend. Then show clips or trailers to Toy Story 3, Despicable Me, and Transformers. Give each student a sticky note and have them put their name on it. On chart paper create the three names at the bottom of the paper, having students create a histogram of their choices.</p> <p><u>Task #1:</u><br/>We have the gross income of the first five weeks for the three movies we just watched clips for. Using the mean , median, and range, you will get to explore which movie was the most successful.</p>   |

## 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 to prompt:

- ✓ How would you organize you data?
- ✓ How do you find mean, median, and range?
- ✓ Is there another way to represent that data?
- ✓ Which data indicator best describes the success of the movie, and why?

To assess:

- ✓ Students' journal work should show computations or pictures.
- ✓ Short debrief of findings and computations by using select student samples.

To advance students' understanding:

- ✓ Is there anything else we can deduct from this data?
- ✓ Have students discuss the class chart and how it relates to the data sheet?

Task #2:

Using all of the movie data, create a box plot. What conclusions can you draw?

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?

Questions to Guide understanding:

- What is the median of the data?
- How do you find the Quartiles?
- Where would I put minimum and maximums?
- Where do I start?

Extensions:

Create a box plot for each movie and compare to overall data

Create a box plot student data

Do ratings matter?

### **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?

Share student work in this order, if available:

Part I:

Students show samples of how they got mean, median, and range  
Look for possible histograms, or graphs to show understanding

Part II:

Have students bring up their chart paper and have them explain their findings through the box plot.

Make sure the striking deviations and the variability.

Ask students what this chart represents.

Compare charts and discuss any variations.

Overall Assessment:

Box plots are correctly constructed.

Students are able to articulate the center and variability, patterns, and deviations on their graphs.

# Movie Money Makers

This chart shows the gross income, by week, of the following movies.

|               | <b>Toy Story 3 (G)</b> | <b>Despicable Me (PG)</b> | <b>Transformers (PG 13)</b> |
|---------------|------------------------|---------------------------|-----------------------------|
| <b>Week 1</b> | \$167.6 million        | \$85.6 million            | \$84.9 million              |
| <b>Week 2</b> | \$91.3 million         | \$52.0 million            | \$102.0 million             |
| <b>Week 3</b> | \$59.4 million         | \$37.2 million            | \$55.5 million              |
| <b>Week 4</b> | \$32.7 million         | \$25.2 million            | \$30.6 million              |
| <b>Week 5</b> | \$19.5 million         | \$15.2 million            | \$17.3 million              |

**1.** Using mean, median, and range, prove which movie was most successful in its first 5 weeks of showing in your journal.

**2.** Using the entire data construct a box plot on chart paper. What conclusions can you draw?

**Extension:**

Following numbers are in millions of dollars

|               | Cars (G) | Wall-E (G) | UP (PG) | Shrek 2 (PG) | Avatar (PG-13) | Spiderman (PG-13) |
|---------------|----------|------------|---------|--------------|----------------|-------------------|
| <b>Week 1</b> | 83.3     | 94.7       | 93.0    | 20.9         | 96.9           | 151.6             |
| <b>Week 2</b> | 50.0     | 49.6       | 63.6    | 143.8        | 69.9           | 88.9              |
| <b>Week 3</b> | 34.6     | 28.4       | 46.1    | 111.9        | 66.3           | 57.3              |
| <b>Week 4</b> | 27.1     | 16.2       | 34.4    | 53.4         | 47.7           | 41.7              |
| <b>Week 5</b> | 17.0     | 10.6       | 21.1    | 34.7         | 42.0           | 20.6              |

**3.** Do ratings make a difference in revenue?