**Lesson Title: M&M distribution**

**Unit Title: Statistics and Probability I**

**Teacher Candidate: Laurel Lefebvre**

**Subject, Grade Level, and Date: 7th grade mathematics, February 2014**

**Placement of Lesson in Sequence**

This is the fourth of four lessons that are designed to cover the first Common Core State Standards (CCSS) cluster within probability and statistics for seventh grade.

**Central Focus and Essential Questions**

The central focus of this lesson is on gauging variation across identically sized multiple samples. Students will weigh individual items taken from commercially produced multi-packs of items, such as candy or cracker packs. The presumption is that these individual packs are uniform and thus should represent individual, identically sized samples. However, due to processing limitations, each item should weigh a slightly different amount.

Essential questions are to describe the variation seen, and to determine whether or not the variation seen is sufficient to determine whether or not accurate claims are being made regarding the weight of a product multi-pack.

**Content Standards**

The Common Core State Standard this lesson is designed to address is:

7.SP.A. 2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

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| **Learning Outcomes** | **Assessment** |
| Students will demonstrate how to generate random samples.  Students will analyze (in a general fashion) the variation between samples.  Students will be able to describe, either verbally or in writing, the variation seen. | Students will create a dot plot from data generated during the activity. They will then write 1-2 sentences describing the general pattern of variation seen, and an additional sentence stating whether or not they got what was paid for in purchasing the package. Students will turn the plots in to the instructor for grading and feedback. |

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| **Learning Targets** | **Student Voice** |
| -I can use the data found by the class to create a dot plot  - By analyzing the dot plot, I can identify variations in the sample data  - By looking at the mean of the data along with the variation, I can determine whether or not it is likely that the actual mean of the population is at least equal to the stated mean | Students can self-select whether to work independently or with a partner, according to their needs/preferences  Students will be given latitude in creating their dot plots, choosing a scale that makes sense to them and that they think is likely to work |

**Prior Content Knowledge and Pre-Assessment**

Students have previously created dot plots using whole number values; creating dot plots with decimal values is a logical extension from that experience. The terminology and concepts of sampling, random sample, and variation have been introduced in the previous lessons within this progression.

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| **Academic Language Demands** | | |
| **Vocabulary & Symbols** | **Language Functions** | **Precision, Syntax & Discourse** |
| * Sampling, random sample, variation, dot plots as summary representations of the data values | * Students should use the term “variation” when talking about the spread of values (weights) seen in the samples * Students should use the term “random” to describe their selection of their sample by pulling it out of a bag | **Mathematical Precision:** The scale we are using for this lesson measures to one decimal place; therefore calculations will use the same place value.  **Syntax:**  **Discourse:** |

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| **Language Target** | **Language Support** | **Assessment of Language Target** |
| Students will use the appropriate terminology at least 90% of the time when discoursing about the topic, whether orally or in writing. | Modeling of proper use of terms by the teacher in both spoken and written discourse.  Explicit instruction in the meaning of the terms as part of the lecture portion of instruction | Review students’ use of proper terms (or lack thereof) in their written work turned in for the lesson |

**Lesson Rationale (Connection to previous instruction and Objective Standards)**

Students will have been introduced to the terminology (sampling, random sample, variation) in the previous lesson, with visual examples provided. In this lesson, students will do a hands-on activity that will reinforce the terminology/concepts.

Students will generate their own random samples by randomly selecting individual packages of “fun size” M&Ms from a large bag of these packages. Students will weigh these packages and post the data on the board to share with the class. Each student will then create a dot plot from this data and use it to analyze the variation, thereby learning from hands-on experience about generating samples and gauging variation, as required for the CCSS that is the basis of this lesson. They will turn their dot plots and related analysis in to the instructor, in order to receive feedback and for the instructor to plan further instruction.

**Differentiation, Cultural Responsiveness and/or Accommodation for Individual Differences**

This lesson should appeal to students with a variety of learning styles, as it is activity based, visual, and kinesthetic. The previous lesson, where the vocabulary was initially introduced, was primarily auditory, so this lesson will teach the information in a different way in order to address the needs of students with different learning styles. Students can work individually or in pairs, based upon need and preference.

**Materials – Instructional and Technological Needs (attach worksheets used)**

**Teacher needs:**

Overhead document camera

Kitchen scales with working batteries

Large bag of “fun size” packages of M&Ms

White board and appropriate pens

Rulers

**Student needs:**

Paper

Pen or pencil

Calculator

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| **Teaching & Instructional Activities** | | | |
| **Time** | **Teacher Activity** | **Student Activity** | **Purpose** |
| :00 | Explanation of activity | Get out paper and writing utensil | Prepare for activity |
| :05 | Carry large bag of small M&M packages around the room for students to draw from | Randomly pull a package out of the bag | Generate a random sample |
| :08 | Direct students to begin; walk around classroom to help out with weighing and calculations | Students use a kitchen scale to weigh their package of M&Ms in grams and write their results on the white board; do a conversion of the individual package weight stated on bag to grams | Collect data on the random samples; all weights in same units in order to make comparisons |
| :23 | Verify any package weights that seem unusual; show an example of a dot plot on the document camera and direct students to create a dot plot using the data generated; hand out rulers | Put the data into a dot plot | Make a visual representation of the data in order to reveal variation |
| :35 | Discuss the resulting dot plot; ask students to voice their observations | State/report observations about the data in the dot plot | Identify variations in the sample data |
| :40 | Ask the students to write 1-2 sentences describing the general pattern of variation seen, and an additional sentence stating whether or not they felt that we got what was paid for in purchasing the bag; allow students to eat the M&Ms if they wish | Write observations regarding variation in the data, make a decision as to whether or not the bag likely weighed the amount stated and explain reasoning. Turn in to instructor. | Demonstrate understanding and report results. Instructor reviews student work, gives feedback, and plans further instruction. |