

M&M MATH

Performance Standard (6A/6C/6D/10A).E

Determine and compare estimates, actual counts, the minimum values, maximum values, ranges, modes, medians, means, ratios and percents of M&Ms in an individual bag and in all students' bags accordingly:

- *Mathematical knowledge:* determine and express estimates, actual counts, the minimum values, maximum values, ranges, modes, medians, means, ratios and percents for a data set,
- *Strategic knowledge:* use appropriate strategies for determining, comparing and interpreting estimates, actual counts, the minimum values, maximum values, ranges, modes, medians, means, ratios and percents, and
- *Explanation:* explain completely and clearly what was done and why it was done.

Procedures

1. ***In order to demonstrate knowledge and use of numbers and their many representations in a broad range of theoretical and practical settings (6A), compute and estimate using mental mathematics, pencil-and-paper methods, calculators, and computers (6C), solve problems using comparison of quantities, ratios, proportions, and percents (6D), organize, describe, and make predictions from existing data (10A),*** students should experience sufficient learning opportunities to develop the following:
 - Show equivalent representations of a number by changing from one form to another form.
 - Evaluate estimates to judge their reasonableness and degree of accuracy.
 - Identify and express ratios using appropriate notation (i.e., a/b , a to b , $a:b$).
 - Model the concept of percent using manipulatives or drawings.
 - Determine mean, median, mode, minimum value, maximum value, and range and explain what each does to help interpret a given data set.
2. Provide each student a copy of the “M&M Math” recording sheet and the rubric. Have students review and discuss the task to be completed and how the rubric will be used to evaluate it. Provide each student with a “Fun Size” (21 grams) bag or “Snack Size” (48 grams) bag of M&Ms. Ask students to complete each of the following steps and not to go onto the next step until directed to do so. Give the following directions:
 - (1) Step 1: estimate how many M & Ms (total number and number of each of the 6 colors) are in your own bag and predict the color with the greatest amount of M&Ms. Record estimates on the sheet. On the back of the sheet have each student write a brief explanation of how s/he estimated the number of M&Ms in his/her bag.
 - (2) Step 2: After students have recorded their estimates, the teacher will ask each student to tell his/her estimate and the teacher will record the responses on the board or overhead. On a separate sheet of paper the students will copy the class collection of estimates and arrange them on a line plot using one color of colored pencil.
 - (3) Step 3: open the bag, count the M&Ms, and record the actual total number and number of each color.
 - (4) Step 4: After the students have recorded that actual number of M&Ms in their bags on their sheets, the teacher will once again ask each student to tell his/her actual number. The teacher will record the data on the board or overhead. Each student will copy the data from the board on the same sheet of paper used for the estimates and arrange the data on the same line plot with the estimates using a different color of colored pencil. Typically the estimates have a larger range and vary more in number. The actual counts typically have a smaller range and cluster around just a few numbers. On the back of the recording sheet each student should, in writing, note this difference and offer an explanation for it. Each student should also write about whether his/her estimate was reasonable or not and why s/he thinks the way s/he does.
 - (5) Step 5: The teacher must record the actual numbers of each color of M&M on the board or overhead. The students must copy the data. Having the student use a colored pencil that is the same color as the M&M helps keep the data straight. Putting each color on just one side of a piece of paper helps too. Example:
Green: 2,4,5,0,1,7,3,2,2,1,0,3,0,5,2,2,4,3,1,0,3
Brown: 6,8,7,5,10,7,8,2,4,5,7,9,8,7,5,6,6,8,7,2,7
Each student then must put each set of data in order from least to greatest or greatest to least. Once the data is organized the student can record the minimum value, maximum value, range, median, mode, and mean for each color. Each student will need to compute a sum of each color to find the mean and to create a ratio using the number from his/her pack and the total from all the packs. From the ratio, a percent can be calculated.
 - (6) Step 6: create ratios and percents for the actual number of each color in your own bag with the actual total.

- (7) Step 7: Have each student write about his/her observations of and conclusions drawn from the data. Students should note that although the total number of M&Ms in a bag doesn't vary much, the individual colors may vary a great deal. They might also observe that there are usually more
3. Evaluate each student's work using the rubric and the guide on the rubric to determine the performance level. As you evaluate this activity you will be looking for the fluid use of organizational techniques such as putting the data in order or displaying it on a line plot. Both of these methods make it easy for the student to determine the minimum value, maximum value, range, mean, median, and mode of a set of data. You will be looking for the ability to express ratios and discuss what each ratio means. Since ratio is often expressed in fraction form, this can be used to figure percent and show equivalent forms of an expression. The explanation should clearly describe what steps were done and why.

Examples of Student Work not available

Time Requirements

- Two to three class periods

Resources

- One small bag of M & Ms for each student
- Calculator for each student
- Copies of "M&M Math" recording sheet
- Mathematics Rubric

NAME _____ DATE _____

M&M MATH

Student Recording Sheet

	Estimate	Actual	Minimum Value	Maximum Value	Range	Mode	Median	Mean	Ratio	Percent
My Pack Total										
Class Total										
My Pack Red										
Class Total Red										
My Pack Green										
Class Total Green										
My pack Yellow										
Class Total Yellow										
My Pack Orange										
Class Total Orange										
My Pack Brown										
Class Total Brown										
My Pack Blue										
Class Total Blue										