

M&M Math

Experimental Procedure

This project follows the  [Scientific Method](#). Review the steps before you begin.

1. In this experiment you will be counting the numbers of different colors of M&M's to calculate the frequencies of the different colors. To do this, first make a data table like Table 1 below in your lab notebook to keep track of your data.

Candy Color	Package					Total	Average	Percentage
	1	2	3	4	5			
Brown								
Blue								
Green								
Yellow								
Orange								
Red								
Whole Bag								

Table 1. In your lab notebook, make a data table like this one to record the number of M&M's of each color in each package.

2. Open the first package of M&M's. Count the number of M&M's of each color and write the numbers in your data table. Do not eat the M&M's before you count them!
3. Repeat step 2 for each package of M&M's.
 - a. You should sample at least five packages, but you can do as many as your parents will let you open. The more samples you take, the better your data will be. However, too many samples and you might get a tummy ache!
4. Calculate the total number of M&M's in each package.

- a. Do this by adding down each column.
 - b. For each package, write the answer in the "Whole Bag" box in the bottom row of your data table.
5. For each candy color, calculate the total number in all of the packages combined. Also calculate the total number of M&M's in all of the packages combined.
- a. Do this by adding across each row.
 - b. Write the answers in the "Total" column of your data table.
6. Calculate the average number of each candy color per package. Also calculate the average number of candies per package.
- a. Do this by dividing the total numbers you calculated in step 5 by the number of packages (which should be 5 or more).
 - b. Write the answers in the "Average" column in your data table.
7. Calculate the percentage of each colored M&M per package using the average data.
- a. Do this calculation by dividing the average number of each color (calculated in step 6) by the average number of M&M's in the whole bag and then multiplying your answer by 100.
 - i. For example, if there are an average of 5 red M&M's in each bag and an average of 50 M&M's in a whole bag, you will divide 5 by 50 (which equals 0.10) and then multiply by 100 (which gives 10%).
 - b. Write the answers in the "Percentage" column in your data table.
 - c. *Note:* If you do this same calculation with your whole bag data, you should get 100%.
8. Make a bar graph using the data from the "Average" column of your data table. It will tell you the frequency of each color of M&M in the package. It is useful for comparing the frequencies of each individual color to each of the other individual colors.
- a. You can make this graph by hand or use a website like [Create a Graph](#) to make the graph on the computer and print it.
 - b. To make the bar graph, label the y-axis (the vertical axis going up and down) with a scale representing the average numbers of M&M's. The smallest number of the scale (minimum) will be zero and the largest number of the scale (maximum) will be set just above the largest average number of M&M's in any color.
 - i. For example, if the largest average number of M&M's counted was 25 brown M&M's, then make the scale on the y-axis go up to 30.
 - c. On the x-axis of the bar graph (the horizontal axis going left and right), make a bar for each color. Make the bar go up to the number on the y-axis that corresponds to the average number of M&M's counted for that color.
 - i. You may want to order the bars on your bar graph from smallest to largest.
 - ii. Label each bar with the correct color (and, if possible, color in the bar with the matching color too).
 - d. Label the bar graph with a title, such as "Average Number of Each M&M Color in a Package."
9. Looking at your data in the bar graph, try to answer the following questions:
- a. In the average package of M&M's, which color are most of the M&M's (highest frequency)?
 - b. Which color is the rarest (lowest frequency)?
 - c. Do any of the colors have the same frequencies?
 - d. Do you see any other trends in your data in the bar graph?

10. Now you are ready to make your second graph, the pie graph, using the data from the "Percentage" column of your data table. It will tell you which portion of the whole bag is of each color. It is useful for comparing the relative proportion of each individual color to the whole population.
- You can make this graph by hand or use a website like [Create a Graph](#) to make the graph on the computer and print it.
 - Using polar graph paper, make a pie graph where each slice colored in is equal to the percentage of one of the colors.
 - For example, if blue M&M's are 15% of a bag, and if your polar graph paper has a slice marked for every 5 units, then color in three of these slices for the blue M&M's.
 - Label each slice with the correct color (and, if possible, use a matching color for each section). You can even write the percent data inside each slice.
 - Make a title for your graph, such as "Percentage of Each M&M Color in a Package."
11. Looking at your data in the pie graph, try to answer the following questions:
- What is the percentage of each color of M&M in the package?
 - Does any color make up more than half of a package? What about more than a third of the package?
12. Looking at your data table and graphs, do you think you can predict what color(s) M&M you are most likely to pick from a package? If so, what color(s) is it?

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