

# [M and m's](https://assignbuster.com/m-and-ms/)

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GOODNESS OF FIT WORKSHEET The following is a quote from the Mars Company, maker of M&M candies: We can assure you that the colors are blended mechanically according to the formula. Our present means of color dispensing should place a fairly uniform blend of colors in every package: however, occasionally an unusual assortment of colors may appear.   
The theoretical percentages of each color (as given by the M&M company) are:   
Red   
Yellow   
Green   
Orange   
Blue   
Brown   
Plain   
20   
20   
10   
10   
10   
30   
Peanut   
20   
20   
20   
10   
0   
30   
1. Each person will need to buy a package of regular colors, Milk Chocolate M&M’s that is at least 4 oz. (colors of red, yellow, green orange, blue, brown) to be used for this project. Exchange your counts with the members of your group to get the total for the group.   
Red   
Yellow   
Green   
Orange   
Blue   
Brown   
Total   
Yours   
18   
19   
8   
13   
12   
36   
106   
Group   
78   
79   
38   
36   
38   
123   
392   
Expected value   
2. Group Leader will total the group values, will sum their color and post those totals on the bulletin board. After consulting with the rest of the group on the answers to these questions the leader will need to post these results on the bulletin board and email this completed form to the instructor.   
Red   
Yellow   
Green   
Orange   
Blue   
Brown   
Total   
Group   
78   
79   
38   
36   
38   
123   
392   
Expected value   
3. Is this frequency data? How can you tell?   
Yes, this is frequency data. This is because the data represents the counts for each color (colors of red, yellow, green orange, blue, and brown) for the regular colors (Plain), Milk Chocolate M&M’s candies.   
4. Write the null and alternative hypotheses. Remember these two statements must include all of the possible outcomes.   
H0:   
Ha: At least one of the proportions is not equal to the given claimed value.   
5. Determine the expected values for all of the M&Ms. Use the number of M&Ms from the whole group.   
The expected frequency for each color is calculated using formula: E = np   
Red   
Yellow   
Green   
Orange   
Blue   
Brown   
Total   
Observed value, O   
78   
79   
38   
36   
38   
123   
392   
Proportion, p   
0. 20   
0. 20   
0. 10   
0. 10   
0. 10   
0. 30   
1. 00   
Expected value, E   
0. 20\*392 = 78. 4   
78. 4   
39. 2   
39. 2   
39. 2   
117. 6   
392   
6. Compute the Chi-square critical value   
There are 6 colors for the Milk Chocolate M&M’s candies. Therefore, the degrees of freedom are   
df = k – 1 = 6 – 1 = 5   
The Chi-square critical value for α = . 05 with degrees of freedom of 5 is = 11. 07. Therefore, decision rule will be   
Reject H0 if χ2 > 11. 07. Otherwise, do not reject H0.   
7. Compute the test statistic value   
Table 1 shows the calculation for the χ2 Test Statistic value.   
The value of test statistic is   
= 0. 5893   
Table 1: Calculating the χ2 Test Statistic for the colors of Milk Chocolate M&M’s candies   
Color   
Observed Frequency O   
Expected Frequency E   
Red   
78   
78. 4   
-0. 40   
0. 16   
0. 0020   
Yellow   
79   
78. 4   
0. 60   
0. 36   
0. 0046   
Green   
38   
39. 2   
-1. 20   
1. 44   
0. 0367   
Orange   
36   
39. 2   
-3. 20   
10. 24   
0. 2612   
Blue   
38   
39. 2   
-1. 20   
1. 44   
0. 0367   
Brown   
123   
117. 6   
5. 40   
29. 16   
0. 2480   
Total   
392   
392   
  
= 0. 5893   
8. Write a decision about null hypothesis:   
Decision: Fail to reject H0.   
This is because the test statistic χ2 = 0. 589 is less than the critical value = 11. 07.   
9. Write a conclusion about the colors of the M&Ms:   
There is not enough evidence to reject the claim about the theoretical percentages of each color given by the M&M Company for the regular colors (Plain), Milk Chocolate M&M’s candies.   
In conclusion, M&M Company’s claim about the proportion for the regular colors (Plain), Milk Chocolate M&M’s candies is correct.   
10. Put the group names on this handout, post your results (number in each category, hypothesis test steps and conclusion) to the BB and email a copy of the handout to the instructor.   
Please write group names   
Triola, Mario F. (2011). Elementary statistics using the TI-83/84 plus calculator. (3rd   
edition).