Date: _____

Names: _____ _____

_____ _____

_____ _____

M&Ms

You are a food scientist for Hershey's. The Marketing Department has just come in and told you that Van Halen has boycotted brown M&Ms, and they are getting calls to remove brown M&Ms from the package by fans. The Marketing Department does not know what to do, and wants you to see if brown M&Ms actually taste different from other colors. If it does, they will have to revise the coating or withdraw the color, costing the company millions of dollars.

Hypothesis

1. State your hypothesis, and your null hypothesis for this experiment (Refer to handout for guidance).

   Hypothesis:

   Null Hypothesis:

2. Now turn to your classmate, and share your hypothesis with one another. Are they the same? What is the difference? Which more closely, directly and simply relates with the scenario described? Why do you think a hypothesis should be direct and simple?

Experimental Design

3. In your assigned group, work together, discuss and design an experiment to test your hypothesis. (Experiments should directly test the hypothesis stated. The results of an experiment should either support the hypothesis, or disprove it.)

The experiment should be that one of you (the subject) will be asked to eat a number of M&Ms. What question should the subject be asked after (s)he eats each M&M? Remember, this question should directly test the hypothesis.

Statistical Significance

When planning an experiment, one important step before you conduct the experiment is to identify possible results, and if those results will support or falsify our alternate hypothesis.

4. What is your expected result if the null hypothesis is correct?

5. What is your expected result if your alternate hypothesis is correct?

6. How many M&Ms should the subject taste during the experiment? Are more M&Ms tasted more likely to make you believe the results?

7. A subject identified the color of the M&M (brown or not brown) correctly 60%. A second subject, using the same experimental conditions, correctly identifies the color of 80% of the M&Ms. Which do you believe more (*i.e.*, of these two results, which one would give you greater confidence that your alternate hypothesis is correct)? Why?

8. In one experiment, one subject correctly identifies 70% of tasted M&Ms. Does this support your alternate hypothesis?

9. You decide to repeat the experiment with the same subject again. Now (s)he correctly identifies only 50% of M&Ms? Does this make you more or less confident of your results?

10. Another group in your class now reports that they found that someone in that group correctly identifies 75% of M&Ms. Does this make you more or less confident of your results?

11. Put all these answers together. What factors determines how much you believe/ are confident that the results from an experiment are real and not simply a fluke?

Experimental Conditions

Many different factors can affect the results of an experiment beyond the hypothesis that the experiment is supposed to test. Therefore, it is important to identify factors that might affect your results, and to plan experimental conditions that minimize these factors.

12. How many of the M&Ms tasted should be brown? How does this change the expected result if the null hypothesis is correct?

13. In each experiment, only one subject (one of your group-members) should taste the M&Ms, to determine if (s)he can identify the brown M&Ms correctly. Why not have each and every group member taste M&Ms and combine into one experiment?

14. Should the non-brown M&Ms all be one color? Why or why not?

15. Should the subject (taster of the chocolate) be able to see or be told what color the M&M is?

16. Should the person who gives the M&M to the subject be able to see what color the M&M is? Why?

17. Should the subject first be trained (i.e., allowed to eat a number of brown and non-brown M&Ms such that the subject knows what they taste like. How many of each M&M should be allowed during training?)

18. In a question above, we said that there will be greater confidence of results if the subject tastes more M&Ms. What is the limiting factor for the number of M&Ms tasted by each subject?

19. Write your protocol below.

20. Record your experimental results.

21. Percentage of correct identification of color of M&Ms:

Conclusion