NAME: _____ PERIOD: _____ DATE: _____

LAB PARTNERS: _____ LAB #21

RADIOACTIVE DECAY
THE HALF LIFE OF AN M&M

INTRODUCTION

Half-life is defined as the time required for one half the mass of a given radioactive isotope to decay, or change into another element. Each radioactive isotope has a half-life that is constant and unique to itself.

OBJECTIVES

At the conclusion of this investigation you will be able to:

1. Determine the half-life of a radioactive isotope
2. Determine the age of a sample given the rate of decay, the amount undecayed, and the original amount of sample

MATERIALS

200 M&M's
Container (plastic shoe box or large cup)

APPROXIMATE TIME

1 –1 ½ periods

PART A PROCEDURE

1. Count out 200 M&M's and place them all on the table with the emblem (M) facing up. MAKE SURE EACH ONE HAS AN M ON IT. THERE ARE DEFECTIVE M&M'S! In this lab, M&M's are considered to be radioactive is the M is facing up and can be seen.

2. Place all the M&M's in a container, shake gently and pour them on a paper towel.

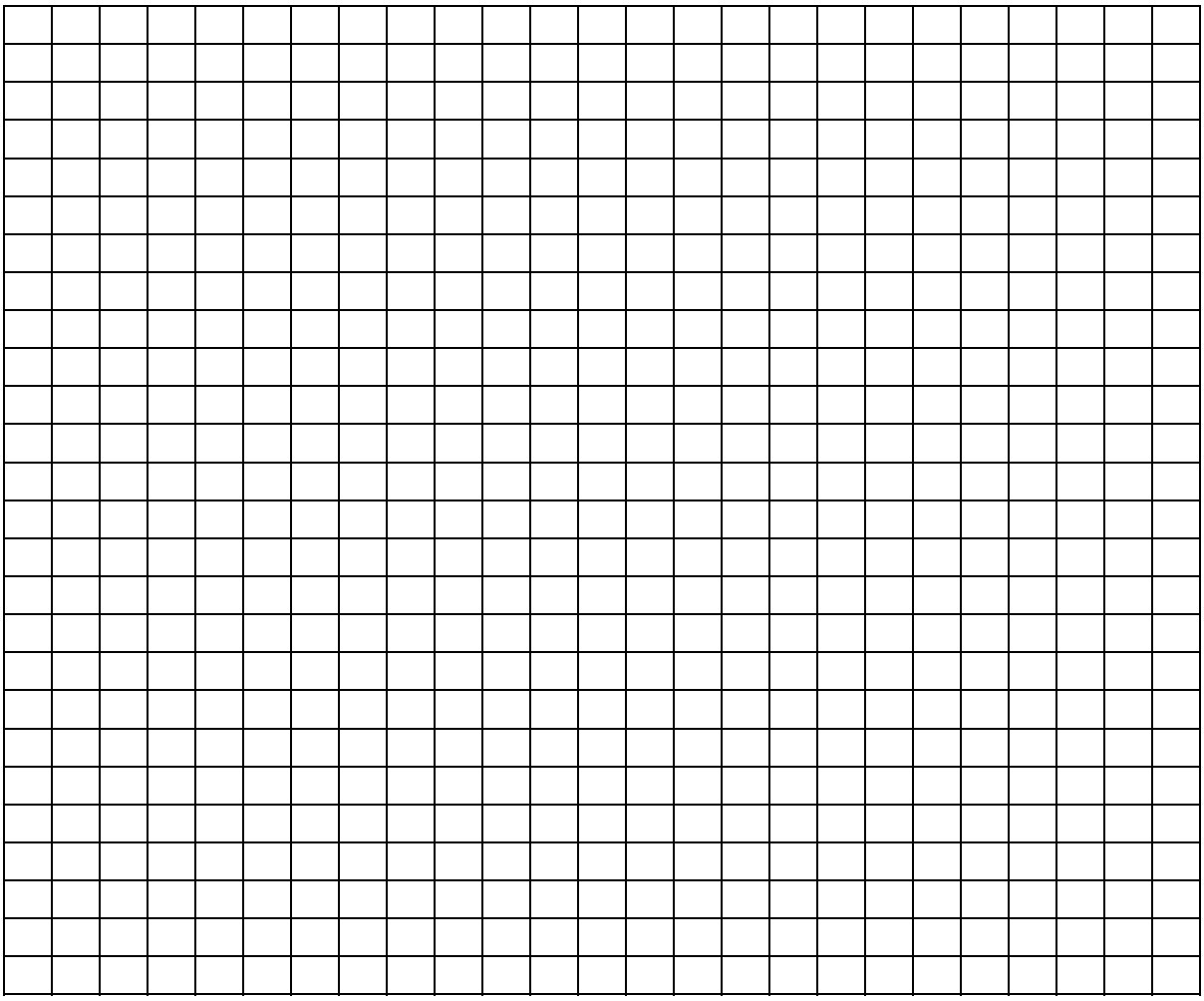
3. Count and remove all the M&M's **not showing** their M's. These have decayed. Enter this number in your data table for Trial 1 under # decayed this trial. Now add this number to the total decayed from the last trial.

4. Count the number of M&M's remaining (M up and still radioactive) and record this as the number of remaining undecayed.

5. Place the remaining undecayed (M up) in your container and repeat steps 2-4 until they are all gone.

TRIAL #	# Remaining Undecayed	# Decayed This Trial	Total Decayed
0	200	0	0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

6. Graph the # Remaining Undecayed vs Trial #. Label this line Undecayed.
7. Then graph the Total Decayed vs Trial #. Label this line Decayed.



LABORATORY QUESTIONS

1. Based on your graph, what **kind** of relationship exists between time that has elapsed and the number of M&M's still radioactive?

2. Describe the relationship between decayed M&M's and time.

3. Would changing the amount of M&M's originally present affect the rate of decay?

4. Assume that the half-life of an M&M is 15 seconds……

   A. If you start with 600 M&M's, how many would be left unchanged after 1 minute? Show all work below

   B. After 1 minute, 30 M&M's remain unchanged. What was the original number of M&M's present. Show all work below.

5. A sample of wood that originally contained 100 grams of carbon-14 now only contains 25 grams of carbon-14. Approximately how many years ago was this sample part of a living tree? How many half-lives has this sample of wood undergone?

PART B OPTIONAL CLASS AVERAGE

TRIAL #	YOUR GROUP REMAINING UNDECAYED	CLASS AVERAGE REMAINING UNDECAYED
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

8. Graph your group remaining undecayed vs. Trial #. Label this Your Group.
9. Graph class average remaining undecayed vs. Trial #. Label this Class Average.

6. How does your group total undecayed compare to the class average undecayed? (Discuss using evidence from your graph)