Exploring Exponential Decay Activity

Purpose:

To explore the process of radioactive decay by using M&Ms to simulate radioactive nuclei that are decaying to form more stable atoms over time.

Procedure:

1. Start the experiment by opening the bag of M&Ms and counting the number of M&Ms inside. Write this number down for Trial 1 in your Data Table

2. Place all of the M&Ms back into the cup, and shake the cup to mix the M&Ms. Pour the M&Ms back on the table. Remove all of the M&Ms with an "M" facing up. Count the remaining M&Ms and record this number for Trial 2.

3. Put the remaining M&Ms back into the cup and repeat the "shake, pour, and count" procedure several times and record the data.

4. If the number of M&Ms reaches zero at any time, the experiment is complete. (You should not use zero as part of your data.)

Results:

Trial Number	Number of M&Ms
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	

* Identify the independent and dependent variable in this investigation and create a scatter plot for your data. Then determine the relationship that exists.

Conclusion Questions:

1. What do the following represent in the simulation?

M&M _____

M&M with an "M" facing up _____

M&M with a blank facing up _____

Each trial _____

2. If each trial represented a time interval of 1.00 minute, how much time did it take for half of the M&Ms/atoms to decay?**

The time that it takes for one half of a radioactive sample to decay is referred to as its **half life.

3. Every radioactive element has characteristic rate of decay as measured by the half-life. How can this information about the half-life of a radioactive element be used?

4. Chromium-48 has a short half-life of 21.6 h. How long will it take 360.00 g of chromium-48 to decay to 11.25 g

5. Potassium-42 has a half-life of 12.4 hours. How much of an 848 g sample of potassium-42 will be left after 62.0 hours?