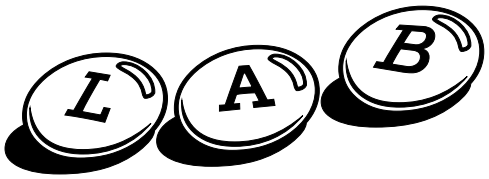


Decay

Mathematical Simulation of a Decaying Function

A decaying function is one in which the values decrease by a nonlinear, but still constant, factor. These functions are often used to model the decay of a radioactive element. The half-life of a substance is the time it takes to reduce its initial effectiveness by one-half. The half-life of Plutonium is 24,360 years, which is why storing atomic waste from nuclear power plants poses such a long-term problem to the environment in which that waste is deposited.

Materials:

M&M's in canisters or in a bulk package
Graphing Calculator
Small paper cup (if bulk package is used)
Paper towel (or clean piece of paper)

Activity:

1. Each participant receives a cup full (or canister) of M&M's and a paper towel.

2. Count the number of M&M's to determine the sample size (N). Record this value as $t = 0$ in your chart. Put the M&M's back in the cup (or canister).

   N= _____

3. Shake the cup and pour the M&M's out on the paper towel. Remove (or eat) all of the M&M's with an ***M*** showing. Count the number left. This number will be the value of N at $t = 1$. Record this value in the table. Return the M&M's that were face down back to the cup or canister.

4. Shake the cup and pour the M&M's out on the paper towel. Remove (or eat) all of thee M&M's with an ***M*** showing. Count the number left. This number will be the value of N at $t = 2$. Record this value in the table. Return the M&M's that were face down back to the cup or canister.

5. Repeat this process until **only one** M&M remains. If the number of M&M's reaches zero at any trial, the experiment is over at that time BUT you should **NOT** use the zero result as part of your table.

Decay

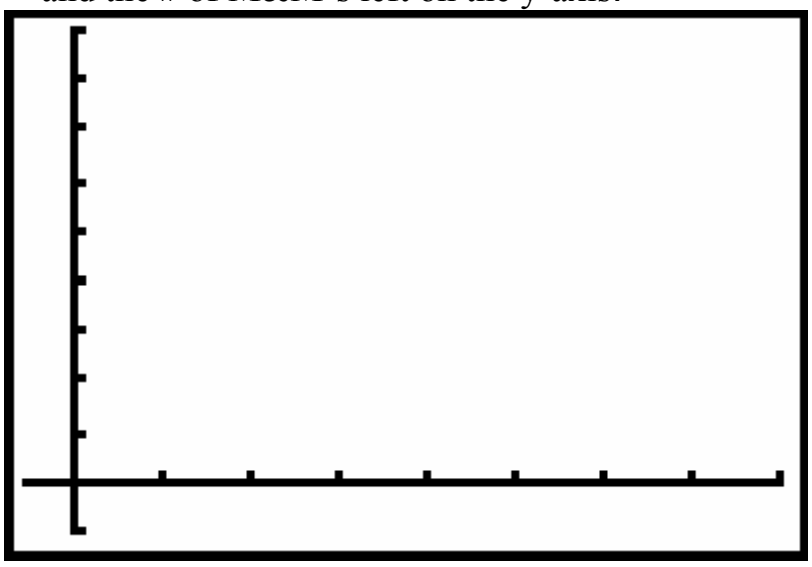
M&M LAB

Name_____

Trial #	# M&M's left
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

1. Enter the data in lists L_1 (trial #) and L_2 (# of M&M's left).

2. Create a scatterplot with the trial # on the x-axis and the # of M&M's left on the y-axis.



3. Using STAT → CALC, find the best regression equation to model this data. Which regression model did you choose? _____
What is your equation?_____

4. Sketch your regression equation on the graph with your scatterplot.

5. What is the correlation coefficient for your model equation? _____
What is the coefficient of determination for your model equation?_____
Is this considered a "good fit"? _____ How do you know?_____
_____

6. Explain what the "a" and "b" values in the equation represent.
_____
_____

7. Why does the "b" value seem to equal approximately 0.5?_____