

## Mathematical Simulation of Rate of Growth

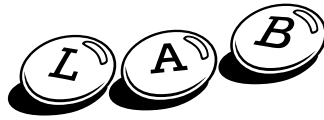
A exponential growth function is one in which the values increase by a nonlinear, but still constant, factor. These functions are often used to model the growth of populations.

**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 starts with **only 4** M&M's in a cup (or canister) and a paper towel.
2. Record the trial  $t = 0$  value as 4 in your chart.
3. Shake the cup and pour the M&M's out on the paper towel. Count the number of M&M's that have the **M** showing. Add an M&M for each one with an **M** showing. Record the **total** number of M&M's under  $t = 1$ . Return all of the M&M's to the cup or canister.
4. Shake the cup and pour the M&M's out on the paper towel. Count the number of M&M's that have the **M** showing. Add an M&M for each one with an **M** showing. Record the **total** number of M&M's under  $t = 2$ . Return all of the M&M's to the cup or canister.
5. Repeat this process four more times.
6. When DONE, eat the M&M's (unless you need the M&M's for the "decay" experiment).

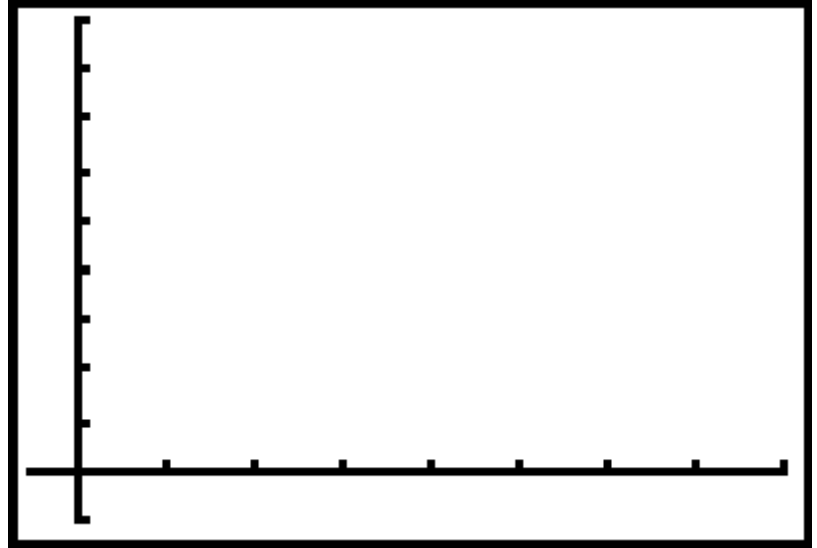
# Growth



Name \_\_\_\_\_

Trial #	Total M&M's
0	4
1	
2	
3	
4	
5	
6	

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



2. Create a scatter plot with the trial # on the  $x$ -axis and the total M&M's on the  $y$ -axis. Use the grid at the right.

3. Using  $\text{STAT} \rightarrow \text{CALC}$ , 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 scatter plot.

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. Using your equation, predict the number of M&M's on trial #10. \_\_\_\_\_

7. Using your equation, predict the number of trials needed to produce a total of 400 M&M's. \_\_\_\_\_

8. Explain what the " $a$ " and " $b$ " values in the equation represent.

\_\_\_\_\_

\_\_\_\_\_

9. Why does the " $b$ " value seem to equal approximately 1.5? \_\_\_\_\_