

Name: _____

Lab Partner: _____

M&M Exponential Growth Lab

We know that bacterial cells, like STEC, grow exponentially, but what does that mean? In our experiment, an M&M represents one STEC cell. If the M&M lands “M” up, the cell divides into the **parent** cell and a **daughter** cell. Bacteria cells can divide like this without end unless they are controlled by intervention. In this experiment, we will not have an intervention to control growth. Follow the directions in this lab to determine what **exponential growth** is and the calculations we can use to monitor growth.

DO NOT EAT ANY OF YOUR M&Ms. YOU NEED THEM FOR THE EXPERIMENT AND WHEN YOU HAVE FINISHED, THEY WILL HAVE BEEN HANDLED BY MULTIPLE PEOPLE. THINK ABOUT THE FOOD SAFETY!

Lab Procedures

1. Place two (2) M&Ms in your cup. These represent trial number 0. Your population (# of M&Ms) is 2.
2. Shake the M&Ms in the cup and dump them onto your table. For every M&M with the “M” showing, add another M&M. For every M&M that lands with the blank side up, do nothing. Count all of the M&Ms and record the new population on the chart under the appropriate trial number. Put all new and old M&Ms in the cup.
3. Repeat step two until you are done with 15 trials or until you run out of M&Ms.

Trial #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
# M&Ms															
Approx % landing face up															
Calculated % landing face up															

4. Graph your data (scatterplot) with the trial number on the x-axis and the number of M&Ms on the y-axis. Use a piece of graph paper and attach to this lab sheet.
5. After each time you shake the cup, approximate the percentage of M&Ms that landed with the imprint of “M” face up by looking at your table.

6. Calculate the percentage of the M&Ms that landed face up in each trial (for trial 2, what percentage of the M&Ms that you *started the trial with* landed face up? Record that number under trial 2). Use this formula to calculate:

a.
$$\frac{\#M\&Ms\ in\ Trial\ 1 - \#M\&Ms\ in\ Trial\ 0}{\#M\&Ms\ in\ Trial\ 0} = \text{percentage landing face up}$$

b. Then calculate the mean of all percentages using the formula:

$$\frac{\%1 + \%2 + \%3 + \%4 + \%5 + \%6 + \%7 + \%8 + \%9 + \%10 + \%11 + \%12 + \%13 + \%14}{14}$$

Mean of all percentages: _____

7. We can write an exponential growth function that models your data using the formula:

$y = C * r^t$ where:

- C = initial amount of M&Ms you started with (Trial 0). Thus, C = _____.
- r = rate of growth (calculated in #6) as a decimal value. Thus, r = _____.
- t = Time, in our case, the number of repetitions. Thus, t = _____.
- Fill in the variables and write your exponential growth equation:

Questions:

- Look at your scatterplot. Should your graph ever touch the x-axis? Why or why not?
- Using the exponential growth model you created above, predict the number of STEC cells there would be in (show your work for each!):
 - Trial 25: _____
 - Trial 50: _____
 - Trial 100: _____