Name_________________________ Partners ________________ _________________

IM1 LAB 06 - M&M Lab (Exponential Growth and Decay)

Part I: Modeling Exponential Growth M&M Activity

The purpose of this lab is to provide a simple model to illustrate exponential growth of cancerous cells. In our experiment, an M&M represents a cancerous cell. If the M&M lands “M” up, the cell divides into the “parent” cell and “daughter” cell. The cancerous cells divide like this uncontrollably-without end.

We will conduct up to 15 trials and record the number of “cancerous cells” on the plate.

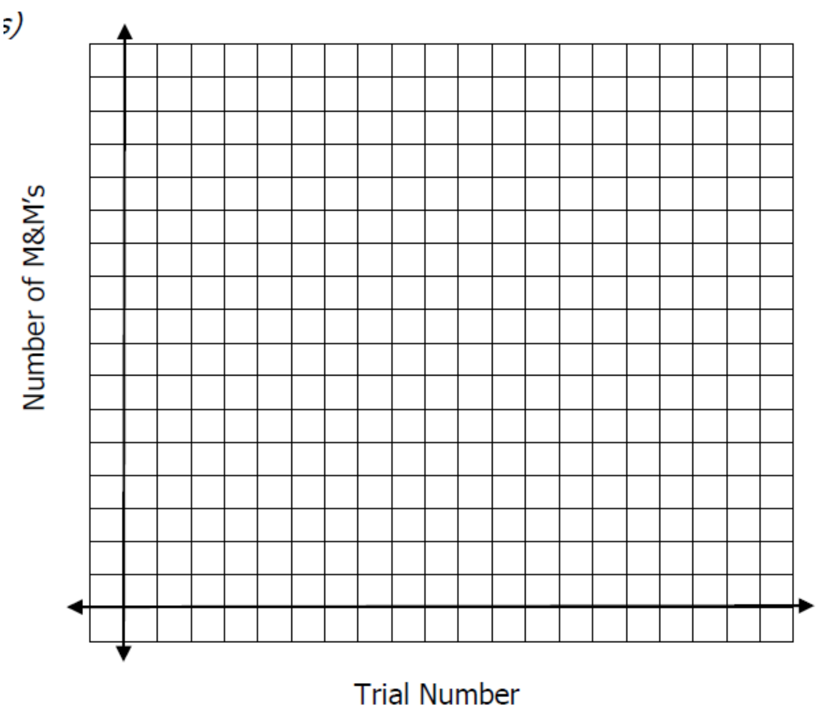
DO NOT EAT THE M&M’s UNTIL YOU ARE DONE COLLECTING ALL DATA

Exponential Growth Procedure

1) Place 2 M&M’s in a cup/plate. This is trial number 0.
2) Shake the cup and dump out the M&Ms. For every M&M with the “M” showing, add another M&M and then record the new population. (Ex. If 5 M&Ms land face up, then you add 5 more M&Ms)
3) Repeat step number 2 until you are done with 15 trials OR you run out of M&Ms.

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
# of M&M’s *(# of cells)*	2															

4) Graph your data (scatterplot) with the trial number on the x-axis and the number of M&M’s on the y axis.



5) To calculate the common ratio, we will divide the numbers of M&Ms from one trial by the number of M&Ms from the preceding trial using the formula below.

$$ratio = \frac{\#\text{ of MMs in Trial 1}}{\#\text{ of MMs in Trial 0}} = \frac{\#\text{ of MMs in Trial 2}}{\#\text{ of MMs in Trial 1}} = \frac{\#\text{ of MMs in Trial 3}}{\#\text{ of MMs in Trial 2}} \quad etc...$$

Complete the table below.

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ratio	X															

Calculate the average of ALL the ratios: ___________________

We can write an exponential growth function that models the data above using the formula **$y = C (a)^t$**

Initial amount of M&M's (# of M&Ms you started with) **C** = ____________

Ratio (calculated average) **a** = ____________ (written as a decimal)

Trial # (this represents a specific phase number) **t** = # of repetitions

Fill in the variables to write your own exponential growth equation: ___________________________________.

6) Use your exponential growth model that you created in #5 to predict the number of "cancerous cells" there would be in:

Trial 8 _____________________ Trial 25 ___________________ Trial 50 ______________________

Part II: Modeling Exponential Decay

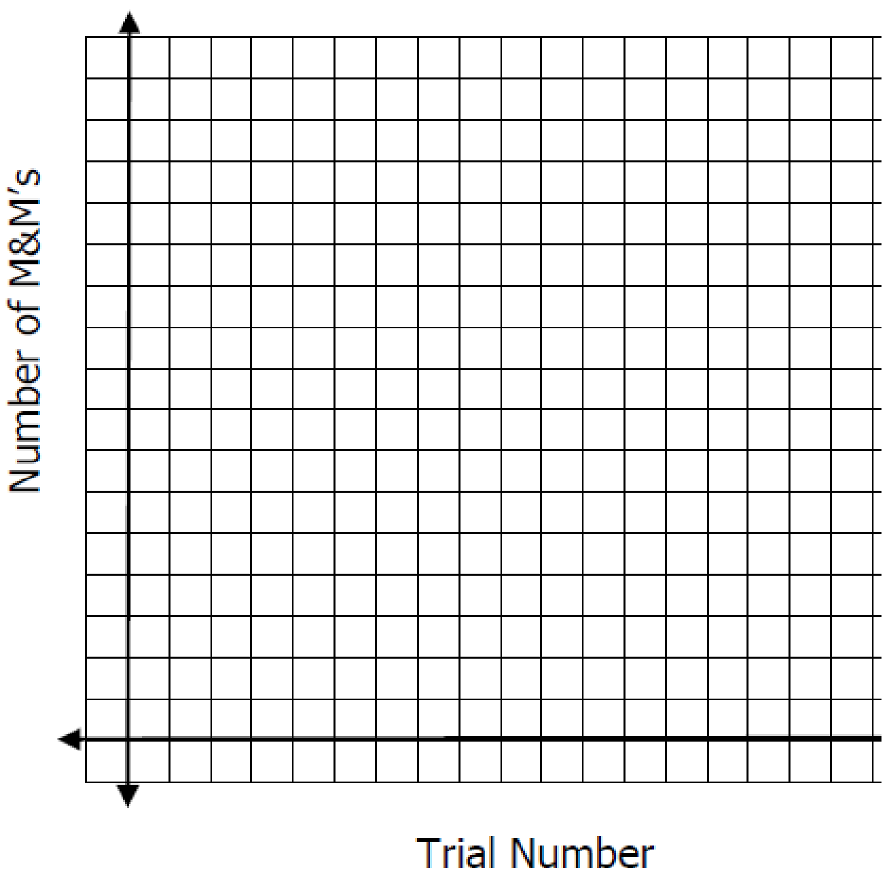
1) Count the total number of M&Ms that you have. Record this number in trial # 0.

2) This time when you shake the cup and dump out the M&Ms, remove the M&Ms with the "M" showing. Record the M&M population.

3) Continue this process and fill in the table. You are done when you have completed 10 phases –OR- when your M&M population gets below 4. Do NOT record 0 as the population!!!

Trial #	0	1	2	3	4	5	6	7	8	9	10
M&M Population											

4) Sketch the graph representing your data.



5) To calculate the common ratio, we will divide the numbers of M&Ms from one trial by the number of M&Ms from the preceding trial using the formula below.

$$ratio = \frac{\#\text{ of MMs in Trial 1}}{\#\text{ of MMs in Trial 0}} = \frac{\#\text{ of MMs in Trial 2}}{\#\text{ of MMs in Trial 1}} = \frac{\#\text{ of MMs in Trial 3}}{\#\text{ of MMs in Trial 2}} \quad etc...$$

Complete the table below.

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ratio	X															

Calculate the average of ALL the ratios: ___________________

We can write an exponential decay function that models the data above using the formula **y = C (a)^{t}**

Initial amount of M&M's (# of M&Ms you started with) **C** = _____________

Ratio (calculated average from above) **a** = _____________ (written as a decimal)

Trial # (this represents a specific phase number) **t** = # of repetitions

Fill in the variables to write your own exponential decay equation: _____________________________________.

6) Use your exponential growth model that you created in #5 to predict the number of "cancerous cells" there would be in:

Trial 5 ______________________ Trial 10 ____________________ Trial 20 _______________________