

Exponential growth and decay

M&M Activity



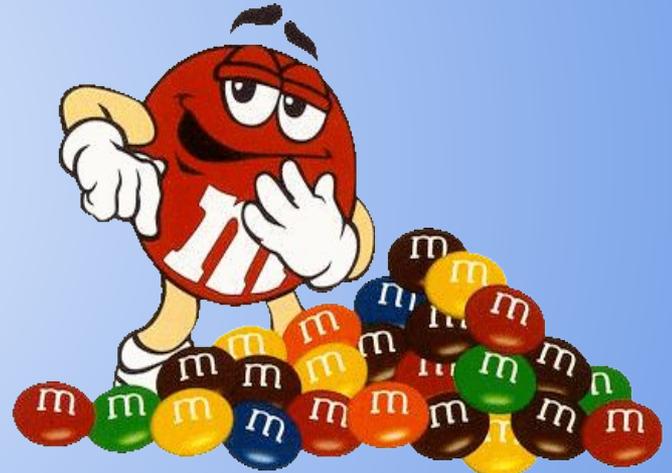
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Goals

The students will work hands-on with m&m's to create graphs of exponential growth and decay, and create functions that model their data.

Objectives

The students will understand that exponential growth and decay models can be used to portray cancerous cells in the body, population growth, the amount of money in a bank based on principal and interest and many more real-world situations.



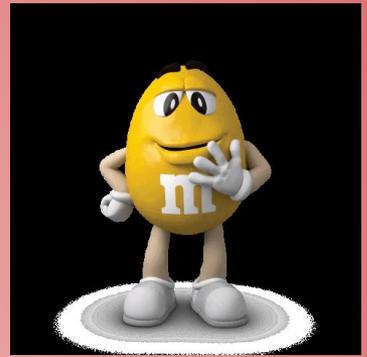
Part I: Modeling Exponential Growth M&M Activity

The purpose of this activity is to provide a simple model to illustrate the exponential growth of cancerous cells. In this experiment, an M&M represents a cancerous cell.

- If the M&M lands with the “M” up, the cell divides into the “parent” cell and “daughter” cell. The cancerous cells divide like this uncontrollably-without end.
- We will conduct 6 trials and record the number of “cancerous cells” on the plate.



Exponential Growth Procedure

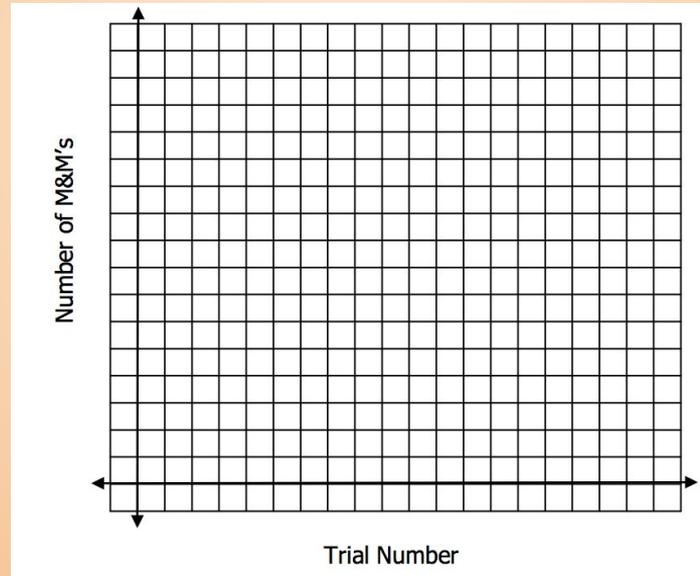


- 1.) Place 2 M&M's in your cup. This is trial number 0.
- 2.) Shake the cup and dump out the M&Ms. For every M&M with the "M" showing, add another M&M and then record the new population in the table provided. (For example, If 5 M&Ms land face up, then you add 5 more M&Ms)
- 3.) Repeat step number 2 until you are done with 6 trials OR you run out of M&Ms. Record your data in the table.

Trial #	1	2	3	4	5	6
# of M&M's (# of cells)	2					

Part I: Modeling Exponential Growth M&M Activity

4.) Using your data create a scatterplot with the trial number on the x-axis and the number of M&M's on the y-axis.



Write your own exponential growth equation

5.) Now we can find an exponential growth function to model our data using our graphing calculators!

- Click **STAT** and choose **1: Edit**. A blank table should appear (if not, to clear the list highlight the list name at the top, click **clear**, then **enter**).
- Under L1, list the trial numbers. Under L2 list the number of M&M's corresponding to the trial. After entering your data go back to your home screen, **2nd QUIT**.
- Click **STAT**, scroll over to **CALC**, go down to option **0:ExpReg** press **ENTER**
- Write your exponential equation rounded to 2 decimal places.

Exponential growth function: _____.

$$y = \frac{\quad}{a} \cdot \left(\frac{\quad}{b} \right)^x$$

Part I: Modeling Exponential Growth M&M Activity

6.) Use your exponential growth equations you created in #5 to predict the number of cancerous cells there would be in the following

Trial 20 _____.

Trial 45 _____.



Part II: Modeling exponential decay

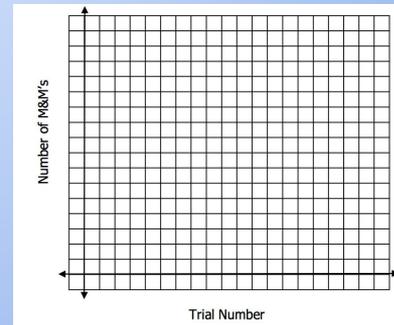
6.) Count the total number of M&M's you have and record this number in trial #0.

7.) This time when you shake your cup and dump out your M&M's remove the ones with the "M" facing up and record the new population.

Continue this process and record the data in the table below until you are done with 6 trials or run out of M&M's.

Trial #	1	2	3	4	5	6
M&M population						

8.) Sketch a graph that models your data.



Part II: Modeling exponential decay

9.) Using your graphing calculators, insert your data from #5 and write the exponential growth function that describes your data.

- Click **STAT** and choose **1: Edit**. A blank table should appear (if not, to clear the list highlight the list name at the top, click **clear**, then **enter**).
- Under L1, list the trial numbers. Under L2 list the number of M&M's corresponding to the trial. After entering your data go back to your home screen, **2nd QUIT**.
- Click **STAT**, scroll over to **CALC**, go down to option **0:ExpReg** press **ENTER**
- Write your exponential equation rounded to 2 decimal places.

Exponential decay function: _____.

In conclusion...

Growth and decay functions can be used in real-world situations to model population growth, growth of cancerous cells in the body, the amount of money in a bank based on principal and interest, the number of cell phones in circulation in the United States, etc.

References

Lesson: Exponential Growth & Decay - An M&M Study. (n.d.). Retrieved from <https://betterlesson.com/community/lesson/316881/exponential-growth-decay-an-m-m-study>