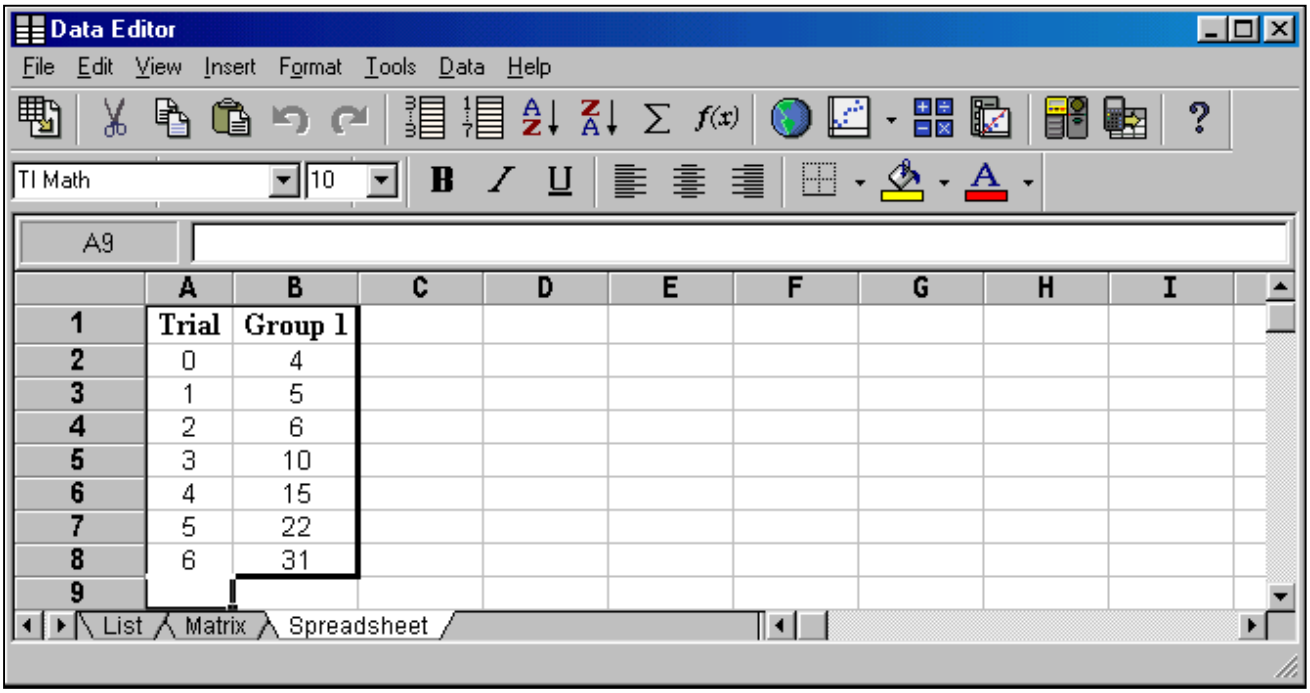
EXPONENTIAL GROWTH AND DECAY – M&M's

USING TI-INTERACTIVE!

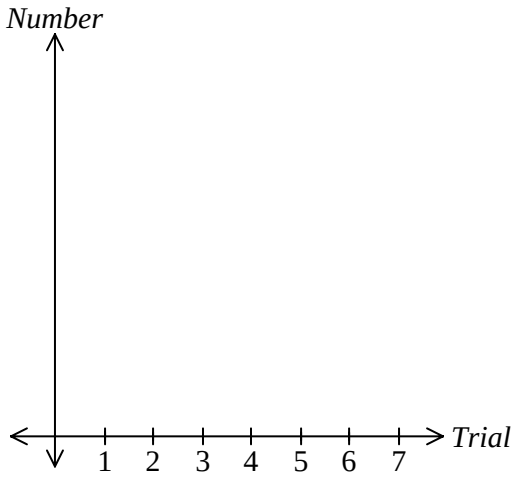
ACTIVITY 1 – GROWTH

1. Start this experiment with 4 M & M's in a plastic cup. Shake the cup and pour the M & M's onto the table. Count the number of M & M's that have the M showing. Add a new M & M for each one with an M showing. Using the new total of M & M's each time, repeat the procedure five more times. Open TI-InterActive! and record your data in a spreadsheet as indicated in the diagram below.

Trial Number	Number of M & M's
0	4
1	
2	
3	
4	
5	
6	



2. Prepare a scatterplot of the data collected. Use the horizontal axis for the trial number and the vertical axis for the total number of M & M's.



3. Use the Statistical Regressions feature to find an exponential function which fits the data. Write the equation in the space provided:

   Number = _____

4. Copy the equation into the function editor and graph this equation on the same axes as the data.

5. Insert a table and use it to predict the number of M & M's on trial number 9. **Answer:** _____

6. Use nSolve to determine the number of trials needed to have 300 M & M's. **Answer:** _____

7. Explain what the coefficients *a* and *b* represent in the general equation $N = a \times b^x$. State the values that *a* and *b* would take in the "ideal situation."

8. Select two data points and set up and solve two simultaneous equations of the form $N = a \times b^x$, where *N* is the number of M&M's, *x* is the trial number and *a* and *b* are constants. Sketch the graph of the function obtained along with the function given by the regression equation on the same screen as the statistical plot of the data.

9. Insert a spreadsheet that compares the results obtained. Comment on the accuracy of the models.

10. a) Given the "ideal situation," suppose that, instead of adding one M&M each time, two M&M's were added. State the rule which would model this situation:

Number = _____

b) What would the rule be if three M&M's are added each time?

Number = _____

c) What would the rule be in the general case where *m* M&M's are added each time?

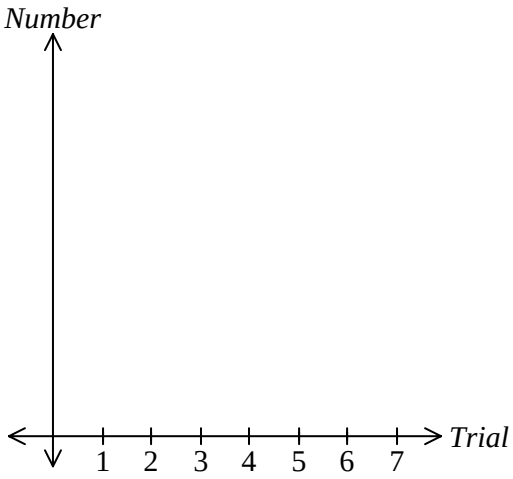
Number = _____

ACTIVITY 2 – DECAY

1. Start this experiment with a cupful of M & M's (approximately 80). Shake the cup and pour the M & M's onto the table. Count the total number of M & M's. Write this as the number for trial number zero (the starting value). Remove all M & M's that have the M showing. Record the total number of M & M's left in the table below. Using the new total of M & M's each time, repeat the procedure five more times. Note: if the number of M & M's reaches zero at any trial, the experiment is over at that time and you should not use the zero result as part of your data.

Trial Number	Number of M & M's
0	
1	
2	
3	
4	
5	
6	

2. Prepare a scatterplot of the data collected. Use the horizontal axis for the trial number and the vertical axis for the total number of M & M's.



3. Use the Statistical Regressions feature to find an exponential function which fits the data. Write the equation in the space provided:

   Number = _____

4. Copy the equation into the function editor and graph this equation on the same axes as the data.

5. Assuming that you start with 900 M&M's, how many trials would you need before the experiment is over? Use a table to assist you.

   Answer: _____

6. Explain what the coefficients *a* and *b* represent in the general equation $N = a \times b^x$. State the values that *a* and *b* would take in the "ideal situation."

7. Suppose that, instead of removing one M&M each time, three M&M's are removed.

   a) Explain why it is impossible to model this situation in a practical context.

   b) What limits are there on the number of M&M's that can be removed?