Activity 3: M&M's® Experiment

The following experiment is designed to simulate a natural occurrence.

No. of the toss	No. remaining
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

Part I. Data Collection

1. Count the M&M's® in the cup that was given to your group, and record this number in the chart to the right of toss no. 0.
2. Shake the cup, and carefully dump the M&M's® on the desktop. Remove and set aside those candies that landed with the *m* showing. Count the ones remaining, and record this number in the chart to the right of toss #1. Place these candies back in the cup.
3. Shake the cup, dump the candy, remove and set aside the ones with the *m* showing, count the remaining, and record.
4. Keep repeating the process, recording the results each time until no *m*'s appear.
5. Graph on your graph paper the collected data from the chart.

Part II. Analysis of Data

6. The data collected can be modeled with an exponential curve of the form $y = ab^x$. Using the graph from Part I, develop an equation to fit the data collected.

7. Give the coordinates of the beginning point in your data.

8. What information does this give about the equation being developed?

9. Locate a second point on the graph.

10. Using this specified point and the original data point, find the value of *b* in the general equation.

11. Write the completed equation for the graph.

12. How well does this equation predict the remaining data on the graph? Check the generated value for *y* and the graphed value for *y* for several chosen values of *x*.

13. How "good" a fit is the equation that you developed?

Part III. TI-83 Graph of the Data

14. The graphing calculator can assist in the development of the equation for the M&M's data.
15. STAT ClrList L1, L2, L3, L4, L5, L6 ENTER This command will clear any previous data.
16. STAT EDIT Enter the trial number in List 1 and the number remaining in List 2.
17. WINDOW Adjust the viewing window to adequately picture the collected data. ZOOM STAT will set an appropriate window automatically.
18. STATPLOT PLOT1 ENTER Choose the type of graph that will picture that data.
19. Y1 = Enter the equation you developed in Part II, and graph this over the data points.
20. How well does your equation "fit" the data points? Any problem areas? Any discrepancies? How accurate is your equation?

Part IV. TI-83 Analysis of the Data

21. STAT CALC A:ExpReg ENTER The calculator will evaluate the data and determine the "best fit" exponential curve in the form of $y = ab^x$ for the data.
22. Give the equation generated by the calculator for this data.

23. What is the correlation coefficient (r) for this equation?

24. What does this mean?

25. Y = Y2 VARS 5:STATISTICS EQ 1:RegEq ENTER This will enter the generated regression equation into the graphing feature of the calculator. ExpReg Y1 or ExpReg Y2 will insert the equation into Y1 or Y2.
26. Graph this equation over the original data points.
27. Use GRAPH Y = Select Y1, put the cursor over the = symbol, and press ENTER to "turn off" the equation in Y1 and view only the original data and the calculator regression equation.
28. How well does this equation match or "fit" the data? Any problem areas?

29. How does this equation compare with the one manually generated in Part II?

Extension

- Describe some natural occurrence that could be depicted with data such as that collected. Thoroughly explain why this data would, in general, fit the occurrence you are choosing.