Exponential Growth and Decay Investigation

Part I - Folding Paper Activity

This is an easy activity which illustrates both exponential growth and decay.

1. Fold a sheet of paper in half as many times as possible.
2. After each fold, record three columns of information in a chart as illustrated below.

Number of Folds (n)	Number of Regions Formed on the Paper (R)	Area of Each Region Relative to the Whole Sheet of Paper (A)
1	2	½ (The area of each region is half the area of the whole sheet.)
2	4	
3		
4		
5		
6		

3. Look for a pattern in the completed chart.
   If n represents the number of folds, develop a formula for finding R, the number of regions formed on the paper.
   If n represents the number of folds, develop a formula for finding A, the area of region relative to the whole sheet of paper.
   Use these formulas to extend the chart to include information on more folds than are physically possible.
4. Make two graphs of the information; one with the number of regions on the y-axis and the number of folds on the x-axis and, the other with the area of region on the y-axis and the number of folds on the x-axis.
5. Answer the following questions
   a) How are the two graphs similar? different?

   b) Which of the two graphs represents an increasing function? a decreasing function?

   c) Which of the two graphs represents an exponential growth? an exponential decay?

   d) While the graph of area versus number of folds is constantly decreasing, why will it never reach the x-axis?