**THE PROBLEM:** *The long standing challenge was that a single piece of paper, no matter the size, cannot be folded in half more than 7 or 8 times. Britney Gallivan broke this record in 2005 by folding a piece of paper in half 12 times. Can you beat that?*

**Directions:**

1. For this investigation, your partner group will be given a piece of computer paper.
2. Fold your computer paper in half. You now have two equal sized sections, each with an area that is half of the original area.
3. Fold the paper in half again. How many sections of paper do you have? What is the area of each section compared to the area of the original piece of paper?
4. Continue this process until you cannot fold the paper anymore. Fill in the table below as you go. You may not fill the entire table, which is okay.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of folds | 0 | 1 | 2 | 3 | 4 | 5 |
| Number of sections |  |  |  |  |  |  |
| Area of each section compared to the area of the paper |  |  |  |  |  |  |

1. The relationship between the number of folds and the number of sections is a function. Why? What is the domain of this function?
2. On the nspire calculator home page, select “new document”. Select “Add Lists and Spreadsheets”. In the first column, type x at the top and add the number of folds. In the second column, type y in the top box and type in the number of sections. Select Menu 🡪Statistics 🡪Stat Calculations 🡪Exponential Regression. The stats should be listed as below, leave the rest as is or blank.

x-list: ‘x y-list: ‘y save RegEqn to: f1 frequency list: 1

* 1. Write the regression in the form y= a\*bx . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a=\_\_\_\_ b=\_\_\_\_

* 1. Use this function to determine the number of sections you would have if you were able to fold the paper 15 times.
  2. Sketch the graph in the box.

Label any points you know .

Label x and y axis.

* 1. This function is an example of exponential growth. What do you notice about the table, equation, and graph of an exponential growth function?

1. The relationship between the number of folds and the area of the section is a function. Why? What is the domain of this function?
2. Follow the same steps from number 6, but instead of the number of sections for the y-axis, now we will use the area of the sections.
   1. Write the regression in the form y= a\*bx . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a=\_\_\_\_ b=\_\_\_\_

* 1. Use this function to determine the area of a section as compared to the area of the original paper if you were able to fold the paper 15 times.
  2. Sketch the graph in the box.

Label points you know.

* 1. This function is an example of exponential decay. What do you notice about the table, equation, and graph of an exponential growth function?