Name_____

Paper Folding Exploration

In this activity, you will be using a standard sheet of paper to investigate the relationship between the number of folds and the number of regions that will be formed. When you fold a sheet of paper in half one time, two regions are formed. If you were to fold the sheet of paper in half again, how many regions would be formed? Continue this method, making sure to fold the paper in half the same way each time, and see if you can discover some sort of pattern or make some mathematical sense out of the paper folding process. Good luck and happy exploration!

Hypothesis
How many folds do you think you can make? Explain your answer below:

Collect and Record Data
Make a table that relates the *number of folds* to the *number of regions*. Properly identify the independent and dependent variables, and fill out the table below accordingly. Start your table with 0 folds and go up to 6 folds.

| Independent Variable							
Dependent Variable							

Making Sense of the Data
Describe the relationship between the number of folds and the number of regions. What patterns, if any, do you see? You may use words, variables, or any other method that makes sense to you to explain what you notice.

Make a Prediction
How many regions would be formed if the sheet of paper could be folded in half 9 times? Explain your reasoning for your prediction and show all of your work below.

<u>Visual Representation</u>

Graph the data that you collected above to see what your data looks like graphically.
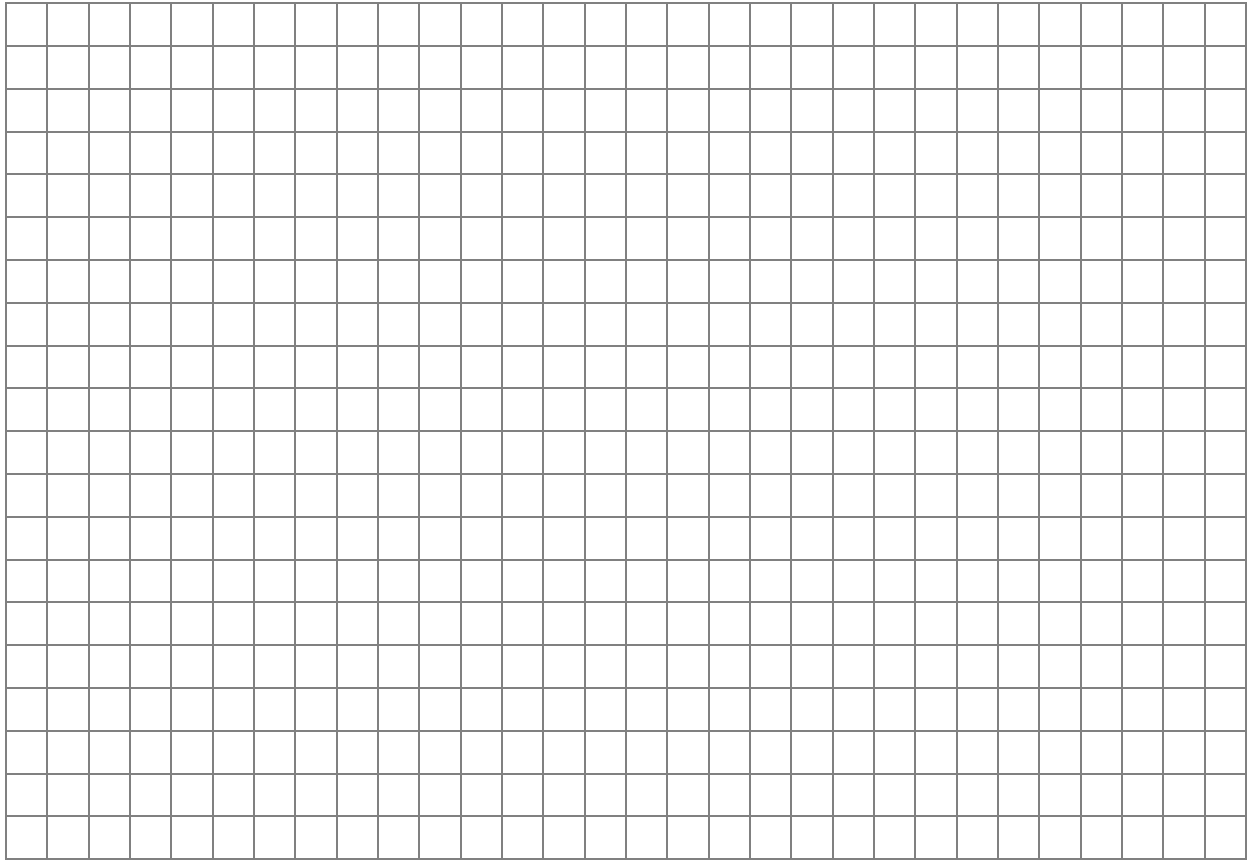
<u>Graph Analysis</u>

Describe the graph by answering the following questions.

a) What does the graph look like? What kind of shape is it forming?

b) What is the slope? What's happening to the slope? Is it increasing or decreasing?

c) What can you conclude from this graph? What does the graph tell you about the relationship between the number of folds and the number of regions?

<u>Create an Equation</u>
Write an equation that represents your data. Use what you have done already to help you with this process. Show all of your work below and explain how you came up with this equation.

<u>Revisit Your Prediction:</u>

    a. What was your prediction for number of regions created for 9 folds? _____

    b. Use the equation you created above to algebraically solve for the number of regions that there would be when a sheet of paper was folded in half 9 times. Show your work below.

<u>Challenge Questions</u>

    a. If the thickness of the paper did not matter, and you could fold the sheet of paper in half 25 times, how many regions would there be?

    b. In the exploration above, you folded your piece of paper in half each time. What would happen if you folded your paper into thirds each time? What would the equation be?

<u>Folding to the Moon.</u>
Now that you have explored how the number of regions increases as you fold the paper in half, we are going to look at how the thickness of the paper is increasing as you fold it in half.

<u>Question:</u> How many times would you need to fold a normal piece of paper in half to get it to reach the moon?
(in other words, how many times would have you need to fold it so that the thickness of the paper was equal to the distance between the earth and the moon?)

What information do you need to know? What information can you assume?

Make sure to show AND explain all of your work.