Day 19a: Folding Paper

1. Start with your paper completely unfolded. Fold your paper into 2 equal parts. How many layers are there? _____ Now, write the number in the table below under 1 fold.

# of times you've folded the paper in **half**	1	2	3	4	5	6	7	8	9
# of layers	2	4	8	16	32	64	128	256	512

2. Without unfolding, fold your paper into 2 equal parts again, count the # of layers, then write the number in the table above.

3. Fill in the rest of the table by continuing to fold your paper as many times as you can.

4. After you finish the table:

a. Look for a pattern. Describe it.

Doubles

b. Explain how you found the number of layers you would have after making 8 folds.

Doubled

5. a. Evaluate 2^8 (use a calculator).

256

b. What does that value represent, if you had folded the paper to find your answer?

After 8 folds, there are 256 layers

c. In 2^{13}, what would the 13 represent in our folding paper exploration?

The number of folds

6. a. Write an equation for the number of layers, y, in terms of the number of folds, x.

$y = 1 \cdot (2)^x$

b. What does the letter "m" represent about the paper folding activity?

Change in # of folds

c. What does the letter "b" represent about the paper folding activity?

Beginning # of folds

7. Assume that your paper is .001 centimeter thick. How thick would your folded paper be after 1 fold? .002
After 2 folds? .001
Fill in the table below:

# of times you've folded the paper in half	0	1	2	3	4	5	6	7	8
Thickness (cm)	.001	.002	.004	.008	.016	.032	.064	.128	.256

8. a. Write an exponential equation to represent this problem: y = $.001(2)^x$, where y = thickness of the folded paper, and x = number of folds.

b. What does the letter "m" represent about the second paper folding activity?

Change in Thickness

c. What does the letter "b" represent about the second paper folding activity?

Beginning Thickness

9. The moon is 238,900 miles away. How many times would you have to fold the paper to reach the moon? (2.54 cm = 1 in, 12 in = 1 ft, 5280 ft = 1 mile)

$238900 \cdot 5280 \cdot 12 \cdot 2.54 = 3.8447228160E10$
Distance of moon in cm. $= 38447228160$

"E" means "move the decimal"

Use the table on calc w/ $y = .001(2)^x$
When $x = 46$, $y = 7E10$, which is bigger than the moon.

10. The sun is approximately 9.3×10^7 miles away. How many times would you have to fold the paper to reach the sun?

$9.3 \times 10^7 \cdot 5280 \cdot 12 \cdot 2.54 = 1.496689920E13$
Distance of sun in cm $= 149,668,992,000,000$

Use table. 54 folds is 1.8E13.