Name: ______________________________ Date: ____________________ Period: ________

Exponential Functions

What is an exponent?

The exponent is the number of times the base is multiplied by itself.

$$\text{base} \longrightarrow b^{x} \longleftarrow \text{exponent}$$

Most of the problems that we have dealt with that included exponents, were ____________________ (x^2).

Exponential functions have a ______________________ in the exponent spot.

Exponential functions get bigger faster (when they're positive) and smaller faster (when they're negative). We saw this on our paper folding task.

Let's look at the function $f(x) = 2^x$.

x	2^x	y
0		
1		
2		
3		
4		
5		

What scale will you need to graph the most of the function? Remember, the x- and y-axis do not need to use the same scale.

Now let's look at what happens when we plug in negative numbers for x.

x	2^x	y
-1		
-2		
-3		
-4		
-5		

Your T-chart will not have many useful plot points. For instance, for $x = 4$ and $x = 5$, the y-values were too big, and for just about all the negative x-values, the y-values were too small to see, so you would just draw the line right along the top of the x-axis.

Let's look at a few examples using a graphing calculator. Sketch them below; Make sure to include the scale.

$f(x) = 3^x$

$f(x) = 3^{-x}$

$f(x) = \frac{1}{3}^{x}$

$f(x) = \frac{1}{3}^{-x}$

What do you notice about these graphs?

What do you think would happen if we added a constant to the equations?

When referring to graphs that are growing to large numbers, we call functions exponential growth functions, and graphs that are getting lower are called exponential decay functions.