Exponents **Name ________________**

We saw in class that we could understand the rule $x^a \bullet x^b = x^{a+b}$ by thinking about what exponents are telling us and by picturing the many factors written out. This rule tells us that having two sets of factors multiplied allows us to just count up all of the times the base appears by adding the exponents.

Explore two other circumstances.

Let's look at the ratio of two exponential terms with the same base: $\frac{2^7}{2^3} = ?$

Write out the numerator and the denominator of the fraction without exponents:

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What happens in this fraction? How is it simplified?

Once you have simplified the fraction (don't just multiply the factors together, leave them as 2's), how many 2's are left and how can you write the answer as 2 to a power?

Make another example with a different base and exponents and show what happens.

Can you determine a rule for examples in this form: $\frac{x^a}{x^b} = ?$

Simplify each of these:

$\frac{3^6}{3^2} =$

$\frac{m^{100}}{m^{50}} =$

$\frac{5^9}{5^3} =$

$\frac{10^k}{10^j} =$

x, the exponent	2^x
1	$2^1 = 2$
2	$2^2 = 4$
3	$2^3 = 8$
4	$2^4 = 16$
5	$2^5 = 32$

Look at the chart above. Describe in words what is happening to the values in the right column each time we move a step up the table (marked by the arrows).

Describe what is happening to the exponents each time we follow an arrow on the left.

Continue both patterns. What discoveries do we make and to what ideas that we have explored do they connect?

What happens if we build a similar table but with a different base other than 2? Fill it in and compare what you discover here with the one above.

x, the exponent	2^x
1	
2	
3	$=$
4	$=$