CW#___ Name:______________________________

7.1.1 How can I solve exponential equations?

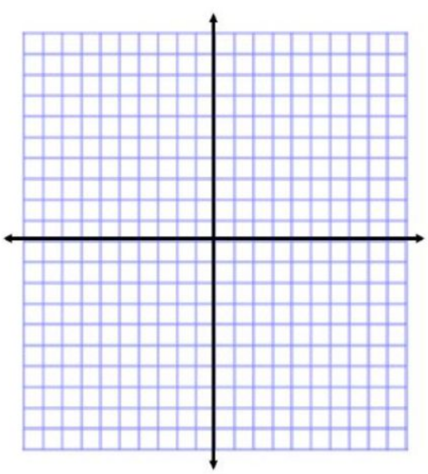
Using Logarithms to Solve Exponential Equations

#1 LOGARITHMS SO FAR
You have learned three important log facts so far. Review these facts by discussing the questions below with your team to ensure everyone remembers these ideas. For each part, make up an example to illustrate your ideas.

a. What is a logarithm? How can log equations be converted into another form?	b. What do you know about the logarithm key on your calculator?	c. What does the graph of $y = \log(x)$ look like? Write the graphing form equation for $y = \log(x)$.

#2 Marta wants to graph $y = \log_2(x)$ on her graphing calculator. She types in $y = \log(2^x)$ and presses GRAPH.

"Wow, that's not the graph I expected." Marta says.
"Hmmm …," says Celeste. *"I think* $y = \log_2(x)$ *and* $y = \log(2^x)$ *are totally different. How can we prove that?"*

a. Show that the two equations are different by sketching the graph of $y = \log_2(x)$. Then sketch what your graphing calculator shows to be the graph of $y = \log(2^x)$. 	b. Now show that $y = \log_2(x)$ and $y = \log(2^x)$ are different by converting both of them to exponential form.

#3 The work you did in problem 7-2 is a **counterexample**. By demonstrating that $\log_2(x)$ is not equivalent to $\log(2^x)$, you have shown that in general, the statement $\log_b(x) = \log(b^x)$ is *false*. For each of the following log statements, use the strategies from problem 7-2 to determine whether they are true or false, and justify your answer. Be ready to present your conclusions and justifications.

a. $\log_5(25) \stackrel{?}{=} \log_{25}(5)$	b. $\log(x^2) \stackrel{?}{=} (\log x)^2$
c. $\log(7^x) \stackrel{?}{=} x\log(7)$	d. $\log(2x) \stackrel{?}{=} \log_2(x)$

#4 In the previous problem only *one* of the statements is true.

a. Use different numbers to make up four more statements that follow the same pattern as the one true statement, and test each one to see whether it appears to be true.

b. Use your results to complete the following statement, which is known as the **Power Property of Logarithms**: $\log(m^n)$ = _______ .

#6 It would be helpful to have an efficient method to solve equations like $1.04^x=2$. Complete parts (a) through (c) below to discover how to solve for x.
a. What makes the equation $1.04^x=2$ so hard to solve?
b. Surprise! In the first part of this lesson, you already found a method for rewriting equations with inconvenient exponents! How can our results from problems #3 and #4 can help us rewrite the equation $1.04^x=2$?
c. Solve $1.04^x=2$ using this new method. Be sure to check your answer.

#7 Solve the following equations. After checking your answer, round them to three decimal places. MAKE SURE IT'S IN EXPONENTIAL FORM FIRST!	
a. $5 = 2.25^x$	b. $3.5^x = 10$
c. $2(8^x) = 128$	d. $2x^8 = 128$

Solve each of the following equations and give both an exact answer and an approximate answer. Be ready to share your strategies with the class.		
a. $1.05^x = 2$	b. $15(3)^x = -6$	c. $-12(10)^x + 3 = -3$