Name: _____ Date: _____ Class Period: _____

Algebra 2   **6.3: Logarithms (Day 3 Worksheet)**

*Note the "**NC**" and "**C**" indications. When using a calculator, round final answers to three decimals.*

1. Solve each equation by getting a common base. *NC*

   a. $3^{2(x-3)} = 27^{8x}$

   b. $27^x = \left(\dfrac{1}{81}\right)^2$

   c. $\left(\dfrac{4}{9}\right)^x = \dfrac{81}{16}$

   d. $16 = \left(\dfrac{1}{8}\right)^x$

   e. $3^{2x+1} = 81^x$

   f. $\dfrac{1}{4^x} = 64^{x+1}$

2. Solve each equation for *x* using an appropriate strategy. Show all work. *NC*

   a. $6\log(x+2) = 12$

   b. $3 \cdot 6^x = 108$

   c. $32^{x-1} = \left(\dfrac{1}{2}\right)^{6x}$

   d. $\log_2(3x+1) = \log_3 243$

   e. $3\log_5 125 = 7x+2$

   f. $4^{3x} + \log_9 1 = \dfrac{1}{128}$

3. Find at least two *integer* ordered pairs you could use to graph the functions below.

$y = \log_2 x$		
x		
y		

$y = \log_3 x$		
x		
y		

$y = \log_4 x$		
x		
y		

$y = \log_5 x$		
x		
y		

4. Max solved the equation, $5^{x+3} = 25^{x-2}$, but made an error. His work is shown below. Circle the step in which the error appears, then correctly solve the problem in the space below.

$$25^{x-2} = 5^{x+3}$$
$$\left(5^2\right)^{x-2} = 5^{x+3}$$
$$5^{2x-2} = 5^{x+3}$$
$$2x - 2 = x + 3$$
$$x = 5$$

5. Scott's parents bought him a really nice car when he was a senior (lucky duck!). Now a beginning software engineer, Scott wants to sell his car and commute via bicycle (health benefits!). He made $25,000 from the sale and wants to invest it in a low-risk account that is compounded monthly. The interest rate he'll get is 6% (lucky duck!). If Scott just turned 23 when he invests the money, what will be his age when the account doubles in value? Show each step algebraically without using a calculator until your final step. Justify your final answer.

6. The decibel (dB) scale is based on the formula below. A typical vacuum cleaner registers at 80 dB, and a typical rock concert registers at 120 dB. How many times more intense in sound is a typical rock concert compared to a typical vacuum cleaner? *NC*

$$N_{dB} = 10\log\left(\frac{I}{I_0}\right);$$ N_{dB} is the change in decibel level; $\dfrac{I}{I_0}$ is the intensity ratio of the two sounds

7. Use the information from question (6). If human breathing registers at 10 dB, how many times more intense in sound is a rock concert compared to human breathing? *NC*