Secondary Math 3   Name _____

5-3 Solving Logarithmic Equations   Period _____

Solve the following equations WITHOUT a calculator.

1. $11^{6x+2} = 121$ 2. $7(2)^{3x} = 56$

3. $6^{3x-9} - 10 = 26$ 4. $5^{\frac{x}{4}} = 25$

5. $e^{2x+5} - 4 = -3$ 6. $\log_2(4x) + \log_2 3 = 3$

7. $\log_4(x-5) = 2$ 8. $\log_6(4x+8) = 2$

9. $\log_3 x^2 = 4$ 10. $\ln(x-3) + 5 = 5$

Solve the following WITH a calculator.

12. The price P of a gallon of gas after t years is given by the equation $P = P_0 (1 + r)^t$ where P_0 is the initial price of gas and r is the rate of inflation. If the price of a gallon of gas is currently $3.25, how long will it take for the price to rise to $4.00 if the rate of inflation is 10.5%?

13. A veterinarian has instructed Harrison to give his dog one 325-mg aspirin tablet for arthritis. The amount of aspirin, A, remaining in the dog's body after t minutes can be expressed by $A = 325 \left(\dfrac{1}{2} \right)^{\frac{t}{16}}$. How long will it take for the amount of aspirin to drop to 50-mg?

14. How long will it take for a $150 initial investment in an account that pays 3.8% compounded continuously to grow to $1,500?

Review
Write each expression as a single logarithm. (no calculator)

15. $3 \log_2 a + 9 \log_2 b$

16. $2 \ln 6 - 6 \ln 5$

17. The population of Smallville in the year 1890 was 6,250. Assume the population increased at a rate of 2.75% per year.

   a. Find the population in 1915.

   b. Find the population in 1940.