Looking for "?"

Name:___________________________

We've learned a lot this year about solving equations, inverses, one-to-one functions, exponents, logarithms, and their properties. Today we are going to put all of these ideas together.

1. Solve for *x*. Write out each step.

$$5x^2 - 9 - 3x^2 + 4 = 27$$

2. Fill in the question marks.
   a. $3^? = 81$ b. $\log_{17} ? = 0$ c. $\log_{36} ? = \frac{1}{2}$ d. $4^? = 27$

3. Re-write each equation in its alternate form (exponential to logarithmic, logarithmic to exponential). Do not solve.
   a. $3^? = 81$ b. $\log_{17} ? = 0$ c. $\log_{36} ? = \frac{1}{2}$ d. $4^? = 27$

4. Why does re-writing the equation in alternate form help you figure out what "?" is?

5. What if the "?" is slightly more buried? Think back to question 1 and try to get "?" by itself.
   a. $\log_3 ? - 4 = 5$ b. $5(2^{7-?}) = 40$ c. $\ln \sqrt{? - 8} = 0$

6. Fill in the question mark. Give a reason for your answer.
   a. $4^? = 4^{11}$ b. $5^{3? - 1} = 5^{20}$

   c. $\log_4 ? = \log_4 10$ d. $\log_7 20 = \log_7 ? - \log_7 2$

7. Combine everything you know about exponents, logarithms, and solving equations to figure out what *x* is.

   $\ln(x + 6) - \ln(x) = \ln(x)$

Section 3.7—Solving Exponential and Logarithmic Equations

Important Ideas:

Check Your Understanding!

1. Solve for *x.*
   a. $\log_{49} x = \frac{1}{2}$
   b. $6^x + 10 = 46$
   c. $5 + e^{x+1} = 20$

2. Use the one-to-one property to solve for *x*.
   a. $\ln(2x - 2) = \ln 11$
   b. $2^{x^2-6} = 8$

3. Solve for *x*.
   $2\log_4 x - \log_4(x^3) = 1$

4. Use your graphing calculator to solve $6e^{1-x} = 25$.

5. Use the formula for continuous compounding, $A = Pe^{rt}$, to find how long it will take \$1500 to *triple* in value if it is invested at 12% interest, compounded continuously.