Logarithmic Functions as Inverses

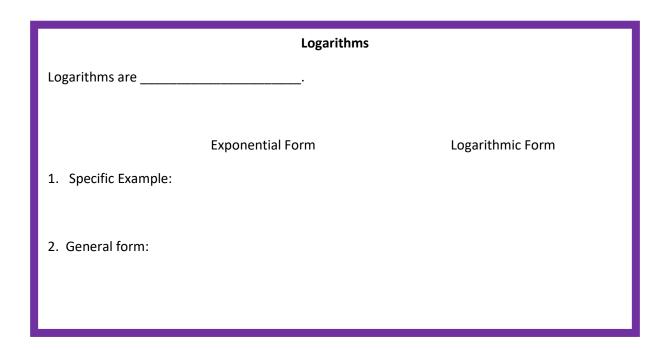**Warm-up: Solve the following equations.**

1. $5^x = 25$
2. $2^x = 8$
3. $7^x = 7$
4. $4^x = 1$
5. $2^x = 5$

Logarithms

Logarithms are _____.

                Exponential Form   Logarithmic Form

1. Specific Example:

2. General form:

Examples: Write in Logarithmic Form

1. $5^2 = 25$
2. $3^6 = 729$
3. $10^0 = 1$
4. $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$

Examples: Write in Exponential Form

5. $log_{10} 1000 = 3$
6. $log_2 \frac{1}{4} = -2$
7. $log_a B = c$

Examples: Evaluate the following logarithms (_____)

8. $log_4 16$
9. $log_3 27$
10. $log_{10} 100$
11. $log_{64}(8)$

Notes:

1. The ***common logarithm*** is a logarithm that uses base _____. You can write the common log as:

   _____ or _____.

2. The ***natural logarithm*** is a logarithm that uses base _____. You can write the natural log as:

   _____ .

3. A logarithmic function is the inverse of the _____.

4. To solve a logarithmic equation _____.

5. To solve an exponential equation _____.

Examples: Solving Logarithmic and Exponential Equations (Round to the nearest thousandth)

12. $25 = 10^{x-1}$

13. $e^{x+2} = 8$

14. $\log(3x - 2) = 2$

15. $\ln(2x + 3) = 4$

16. How long does it take for $250 to grow to $600 at 4% annual interest rate compounded continuously? Round to the nearest year.

17. Michael invests $1000 in an account that earns a 4.75% annual interest rate compounded continuously. Peter invests $1200 in an account that earns 4.25% annual interest rate compounded continuously. Which person's account will grow to $1800 first?