NAME _____ DATE _____ PERIOD _____

9-4 Study Guide and Intervention

Common Logarithms

Common Logarithms Base 10 logarithms are called **common logarithms**. The expression $\log_{10} x$ is usually written without the subscript as $\log x$. Use the LOG key on your calculator to evaluate common logarithms.

The relation between exponents and logarithms gives the following identity.

Inverse Property of Logarithms and Exponents	$10^{\log x} = x$

Example 1 **Evaluate log 50 to four decimal places.**

Use the LOG key on your calculator. To four decimal places, $\log 50 = 1.6990$.

Example 2 **Solve $3^{2x+1} = 12$.**

$3^{2x+1} = 12$	Original equation
$\log 3^{2x+1} = \log 12$	Property of Equality for Logarithms
$(2x + 1) \log 3 = \log 12$	Power Property of Logarithms
$2x + 1 = \frac{\log 12}{\log 3}$	Divide each side by log 3.
$2x = \frac{\log 12}{\log 3} - 1$	Subtract 1 from each side.
$x = \frac{1}{2}\left(\frac{\log 12}{\log 3} - 1\right)$	Multiply each side by $\frac{1}{2}$.
$x \approx 0.6309$	

Exercises

Use a calculator to evaluate each expression to four decimal places.

1. log 18 **2.** log 39 **3.** log 120

4. log 5.8 **5.** log 42.3 **6.** log 0.003

Solve each equation or inequality. Round to four decimal places.

7. $4^{3x} = 12$ **8.** $6^{x+2} = 18$

9. $5^{4x-2} = 120$ **10.** $7^{3x-1} \geq 21$

11. $2.4^{x+4} = 30$ **12.** $6.5^{2x} \geq 200$

13. $3.6^{4x-1} = 85.4$ **14.** $2^{x+5} = 3^{x-2}$

15. $9^{3x} = 4^{5x+2}$ **16.** $6^{x-5} = 2^{7x+3}$