Name:_____ Hour: _____ Date: _____

NOTES: Section 7.4 – Evaluate Logarithms and Graph Logarithmic Functions

Goals: #1 - I can interchange between exponential and logarithmic form.

#2 - I can evaluate a logarithm without using a calculator.

#3 - I can evaluate common and natural logarithms with a calculator.

#4 - I can simplify a logarithm.

#5 - I can find the inverse of an exponential function or logarithm.

#6 - I can graph a logarithm.

Homework: Lesson 7.4 Worksheet

Exploration #1: Work with a partner and answer the following questions.

1. Find the value of x in each exponential equation.
   a. $2^x = 8$ b. $3^x = 9$ c. $4^x = 2$

   d. $5^x = 1$ e. $5^x = \frac{1}{5}$ f. $8^x = 2$

Notes:

We know that $2^2 = 4$ and $2^3 = 8$. However, for what _____ of x does $2^x = 6$?

Mathematicians define this x-value using a _____ and write _____.

The _____ of y with base b is defined as:

if and only if

Example #1: Rewrite the equations.

Logarithmic Form	Exponential Form
1. $\log_2 32 = 5$	
2. $\log_7 1 = 0$	
3.	$13^1 = 13$
4.	$\frac{1}{2}^{-1} = 2$
5. $\log_3 x = 5$	
6. $y = \log_6 x$	
7.	$8^x = y$
8.	$4^3 = 64$
9.	$25 = 5^{4x}$

Notes:

Logarithms evaluate _____. To help you find the value of a $\log_b y$ ask yourself "_____?"

Example #2: Evaluate the logarithm.

1. $\log_3 81$ 2. $\log_4 0.25$

3. $\log_{1/4} 256$ 4. $\log_{49} 7$

You practice: Evaluate the logarithm.

1. $\log_{1/5} 25$ 2. $\log_{10} 0.001$

Name:_____ Hour: _____ Date: _____

Notes:

A _____ is a logarithm with base _____.

      Common Logarithm:

A _____ is a logarithm with base _____.

      Natural Logarithm:

Most calculators have keys for evaluate _____ and _____ logarithms.

Practice: Evaluate the common and natural logarithms using your calculator.

    1. $\log 8 =$ 2. $\ln 0.3 =$

Notes:

By the definition of a _____, it follows that the logarithmic function

$g(x) = \log_b x$ is the _____ of the _____ function $f(x) = b^x$.

This means that:

Example #3: Simplify the expression.

    1. $e^{\ln 9}$ 2. $\log_3(3^4)$ 3. $\log_2 64^x$

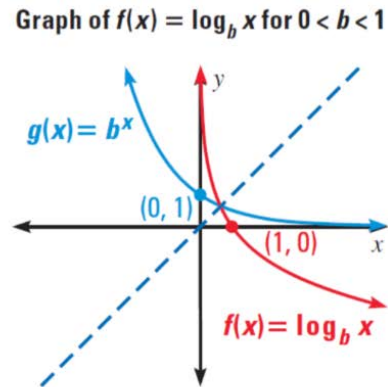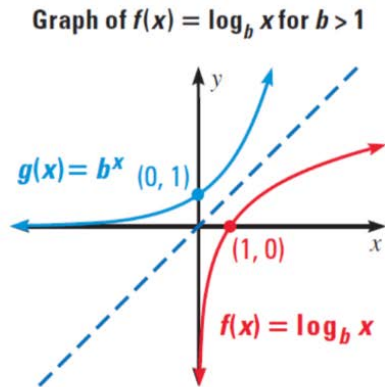**You practice:** Simplify the expression.

    1. $8^{\log_8 x}$ 2. $\log_5 25^x$ 3. $10^{\log 4}$

Name:_____ Hour: _____ Date: _____

Notes:

_____ and _____ functions are

_____ of each other.

Graph of $f(x) = \log_b x$ for $b > 1$ Graph of $f(x) = \log_b x$ for $0 < b < 1$

To find the inverse of these functions, we will _____ the equation and

_____ the x and y and solve for _____.

To graph _____ functions, we will _____ the equation.

Example #4: Find the inverse of the function.

   1. $y = \log_{3/2} x$ 2. $y = e^x$

You practice: Find the inverse of the function.
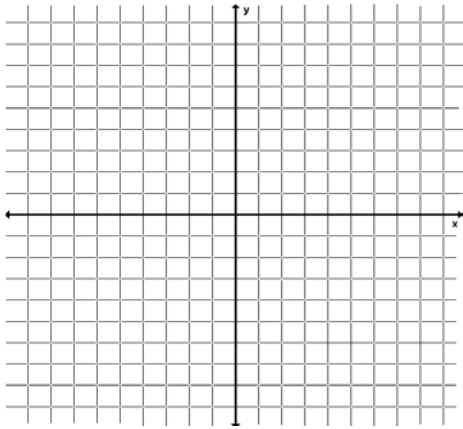
   1. $y = \ln(x - 4)$ 2. $y = 6^x$

Name:_____ Hour: _____ Date: _____

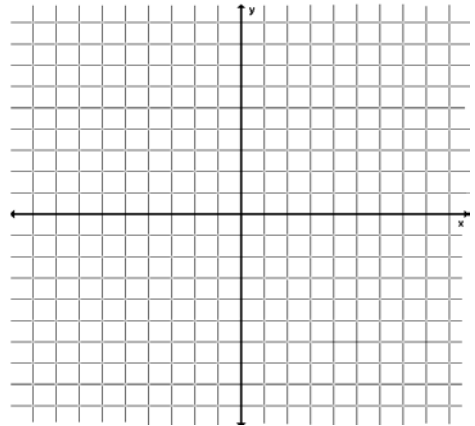**Example #4:** Graph the following logarithmic functions. State the domain and range.

1. $y = \log_2 x$

2. $y = \log_3(x - 1) + 2$

Domain: _____

Range: _____

Domain: _____

Range: _____