Integrated Math 3
Unit 8: Exponential & Logarithmic Functions
8.6

Name: _____

Date: _____ Period: _____

Objective: To determine the inverse of exponential functions.

Warm Up:

1. Rewrite the following by converting from exponential to logarithmic or logarithmic to exponential.

A.) $6^3 = 216$ B.) $\log_5 25 = 2$

$\log_6 216 = 3$ $5^2 = 25$

2. How can you tell from looking at a graph whether two functions are inverses?

The functions will be symmetric over the line $y = x$

Recall:

How to Determine an Inverse Function

- Change the function notation to $y =$ ($f(x) =$)
- Switch x and y
- Solve for y (get y alone)
- Rewrite y using function notation ($f^{-1}(x) =$)

Example 1: Determine the inverse function of $g(x) = 3^x$

$y = 3^x$

$x = 3^y$

$\log_3 x = y$

$g^{-1}(x) = \log_3 x$

Example 2: Determine the inverse function of $f(x) = 4^x + 3$

$y = 4^x + 3$

$x = 4^y + 3$

$-3 \qquad -3$

$x - 3 = 4^y$

$\log_4 (x-3) = y$

$$f^{-1}(x) = \log_4 (x-3)$$

Example 3: Determine the inverse function of $f(x) = 2^{x-4} + 5$

$y = 2^{x-4} + 5$

$x = 2^{y-4} + 5$

$-5 \qquad -5$

$x - 5 = 2^{y-4}$

$\log_2 (x-5) = y - 4$

$+4 \qquad +4$

$\log_2 (x-5) + 4 = y$

$$f^{-1}(x) = \log_2 (x-5) + 4$$