Review

1.) Rewrite as an exponent:

$$\log_7 49 = 2$$

2.) Rewrite as a logarithm:

$$2^5 = 32$$

3.) Evaluate:

$$\log_5 125$$

Properties of Logarithms

- The properties of logarithms can be derived from the properties of exponents.
- We use these properties to solve equations.

Properties of Logarithms

Suppose m and n are positive numbers, b is a positive number other than 1, and p is any real number. Then the following properties hold.

Property	Definition	Example
Product	$\log_b mn = \log_b m + \log_b n$	$\log_3 9x = \log_3 9 + \log_3 x$
Quotient	$\log_b \frac{m}{n} = \log_b m - \log_b n$	$\log_{\frac{1}{4}} \frac{4}{5} = \log_{\frac{1}{4}} 4 - \log_{\frac{1}{4}} 5$
Power	$\log_b m^p = p \cdot \log_b m$	$\log_2 8^x = x \cdot \log_2 8$
Equality	If $\log_b m = \log_b n$, then *m* = *n*.	$\log_8(3x-4) = \log_8(5x+2)$ so, 3x – 4 = 5x+2

Example:

Solve each equation.

$$1.)\ \log_8(4x+6) = \log_8(8x-2)$$

Example:

Solve each equation.

$$2.)\ \log_9 x + \log_9 (x-2) = \log_9 3$$

Example:

Solve each equation.

$$3.)\ \log_p 64^{\frac{1}{3}} = \frac{1}{2}$$

Try:

Solve each equation.

$$4.)\ \log_4(2x+11) = \log_4(5x-4)$$

Try:

Solve each equation.

$$5.)\ \log_{11} x + \log_{11}(x+1) = \log_{11} 6$$