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.
<table>
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<tr>
<th>Property</th>
<th>Definition</th>
<th>Example</th>
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<tbody>
<tr>
<td>Product</td>
<td>( \log_b mn = \log_b m + \log_b n )</td>
<td>( \log_3 9x = \log_3 9 + \log_3 x )</td>
</tr>
<tr>
<td>Quotient</td>
<td>( \log_b \frac{m}{n} = \log_b m - \log_b n )</td>
<td>( \log_{\frac{1}{4}} \frac{4}{5} = \log_{\frac{1}{4}} 4 - \log_{\frac{1}{4}} 5 )</td>
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<tr>
<td>Power</td>
<td>( \log_b m^p = p \cdot \log_b m )</td>
<td>( \log_2 8^x = x \cdot \log_2 8 )</td>
</tr>
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</table>
| 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.) \( \log_{11} x + \log_{11} (x + 1) = \log_{11} 6 \)