p. 34-35 Solving Log Equations by Rewriting Day $2 \quad 7.5$

## Warm-up:

p. 34

Solve the following equation for $x$.


We have solved simple equations by
Writing Logarithm Form to Exponential Form.

Today we will learn how to solve equations by writing Exponential Form to Logarithm Form.
In order to solve these types of equations we will first learn how to evaluate logarithm expressions.

A simple example:

## Evaluate: $\log _{3} 9$

According to our definition of a logarithm, we may say that " $\log _{3} 9$ " can be found by asking yourself: "what power do I raise the number 3 to in order to get 9?"

What is the answer?


A not so simple example:
Evaluate: $\log _{3} 200$
According to our definition of a logarithm, we may say that " $\log _{3} 200$ " can be found by asking yourself: "what power do I raise the number 3 to in order to get 200?"

Could we use mental math to evaluate this log expression?

We will use the Change of Base Formula:

$$
\log _{b} x=\frac{\log x}{\log b}
$$

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\log _{b} x=\frac{\log x}{\log b}
$$

Evaluate the logarithms using the Change of Base Formula. Round to the nearest hundredths when necessary.

1) $\log _{3} 9$

2) $\log _{3} 200$

4.82

$$
\log _{b} x=\frac{\log x}{\log b}
$$

3) $\log _{4} 308$


$$
4.13
$$

Solve the following for $x$. Round to the nearest hundredths when necessary.
4) $9^{x}=585$

5) $2^{x}+10=100$


$$
x=2.90
$$



$$
x=6.49
$$

$$
\log _{b} x=\frac{\log x}{\log b}
$$

6) 

$$
\begin{array}{cc}
\frac{2 \cdot 4^{x}}{2}=\frac{800}{2} & \text { 7) } 7^{(x-11)}=290 \\
4^{x}=400 & \log _{7} 290=x-11 \\
\log _{4} 400=x & \frac{\log _{290}=x-11}{\log _{7} 7}=x-11 \\
\frac{\log _{400}}{\log 4}=x & 2.91=x-11 \\
x=4.32 & 13.91=x
\end{array}
$$

$$
y=250(1.0125)^{4 t}
$$

Where $t$ represents the number of years that have passed.
How many years will it take for your bank account balance to reach $\$ 4,000$ ?

$$
\begin{gathered}
\frac{4000}{250}=\frac{250(1.0125)^{4 t}}{250} \\
16=(1.0125)^{4 t} \\
\log _{(1.0125)} 16=4 t \\
\frac{\log _{16} 16}{\log ^{1.0125}}=4 t \\
\frac{223.19}{4}=\frac{4 t}{4} \\
55.8=t \\
y r s .
\end{gathered}
$$

$$
\text { p. } 34
$$

9) The number of bunnies can be found using the following equation:

$$
y=15(1.08)^{t}
$$

Where $t$ represents the number of years that have passed.
How many years will it take for the number of bunnies to reach $\mathbf{1 2 0}$ ?


Homework!
Solving Log/ Exp Equations - Day 2

