# Defining and Evaluating Logarithms Review

Objective: I can evaluate a logarithmic expression

How could we solve each of the following equations algebraically for x?

$$x^2 = 9$$

$$\times 3^{\times} = 9$$

What's the difference?

# Problems like $3^x = 9$

are why we have logarithms!

What does this problem mean? Estimate the value for x.

$$5^{\frac{5}{25}}$$
 $5^{\frac{5}{25}}$ 
 $5^{\frac{5}{25}}$ 
 $5^{\frac{5}{25}}$ 

Estimate the value for x.

$$3^{x} = 90$$

$$y^x = z$$

Logarithm Activity! Yay!



What does the following equation mean?

$$\log_4 16 = x$$

Evaluate the following logarithms.

$$log_2 8$$

$$\log_2 32$$

$$\log_2 \frac{1}{4}$$

$$\log_4 \frac{1}{64}$$

#### **Exponential Equation**

**Logarithmic Equation** 

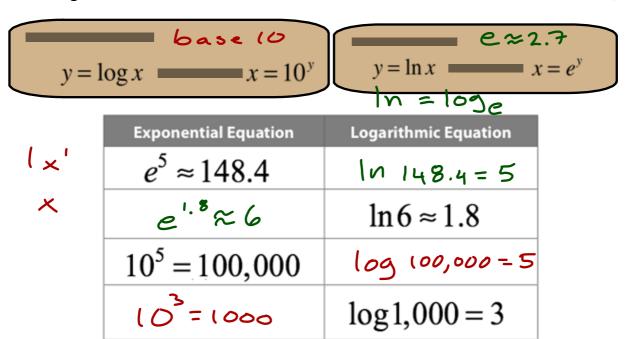
$$b^{x} = a \longrightarrow \log_{b} a = x$$

$$2^{x} = 16$$

$$\log_{b} a = x$$

#### Switch between Log and exponential forms

Exponential Equation	Logarithmic Equation
3 <sup>5</sup> = 243	109343=5
4-3 = 1	$\log_4 \frac{1}{64} = -3$
$\left(\frac{3}{4}\right)' = s$	
	$\log_{\frac{1}{5}}v=w$



log<sub>25</sub> What about these? 
$$\log_8 \frac{1}{64} = -2$$

$$\log_{25} 5 \qquad \log_8 2 \qquad \log_{125} 5$$

$$\frac{1}{25} = 25$$

Notice a pattern?

## And these?

$$\log_{\frac{1}{4}} 16$$

$$\log_{\frac{1}{2}} 8$$

$$\log_{\frac{1}{3}} 81$$

# Notice a pattern?

Evaluate the following logarithms.

$$\log_{27} 3$$

$$\log_{\frac{1}{4}} 64$$

$$\log_{81} 9$$

$$\log_{\frac{1}{7}} 243$$

## Here are some fun ones!

$$\log_{80} \frac{1}{9} \qquad \log_{16} \frac{1}{2} \\
 -\frac{1}{2} \qquad -\frac{1}{4}$$

$$10949\frac{1}{7}$$
 $49^{0}=\frac{1}{7}$ 

#### Last ones.

$$\log_0 3$$
  $\log_{16} -\frac{1}{2}$   $\log_{16} 0$  undefined and

# Why don't these work?