Defining and Evaluating Logarithms Review

Objective: I can evaluate a logarithmic expression

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

$x^2 = 9$ $3^x = 9$

What's the difference?

Jun 14-11:51 AM

Problems like $3^x = 9$

are why we have logarithms!

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

$$5^x = 50$$

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.

$\log_2 8$ $\log_2 32$ $\log_2 \frac{1}{4}$

$\log_3 81$ $\log_7 243$ $\log_4 \frac{1}{64}$

Jun 14-12:00 PM

Exponential Equation	Logarithmic Equation
$b^x = a$	$\log_b a = x$

Switch between Log and exponential forms

Exponential Equation	Logarithmic Equation
$3^5 = 243$	
	$\log_4 \frac{1}{64} = -3$
$\left(\frac{3}{4}\right)^r = s$	
	$\log_{\frac{1}{5}} v = w$

$y = \log x$ [redacted] $x = 10^y$

$y = \ln x$ [redacted] $x = e^y$

Exponential Equation	Logarithmic Equation
$e^5 \approx 148.4$	
	$\ln 6 \approx 1.8$
$10^5 = 100{,}000$	
	$\log 1{,}000 = 3$

What about these?

$\log_{25} 5$ $\log_{8} 2$ $\log_{125} 5$

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!

$\log_{81} \frac{1}{9}$ $\log_{16} \frac{1}{2}$

Last ones.

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

Why don't these work?

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

Convert to exponential form, then write each side in terms of the same base.

$\log_2 8$ $\log_4 64$ $\log_{27} 3$

BTDubs, this works to evaluate "weird" logs. Find the exact value of each log without a calculator.

$\log_8 4$ $\log_{16} 64$ $\log_4 8$ $\log_{64} 16$

You try!

This works for any logarithm!

$\log_{32} 4$ $\log_{27} 9$ $\log_{125} 25$ $\log_{27} 81$