WARM UP - NO CALCULATOR

Solve each equation.

1) $\sqrt[3]{8} = \sqrt[3]{x^3}$ x=2

$2^3 = x^3$

2) $\left(x^{\frac{1}{4}}\right)^4 = (2)^4$ x=16

Pull

3) $27 = 3^x$ x=3

$3^3 = 3^x$

4) $4^6 = 4^{2x}$

$6 = 2x$

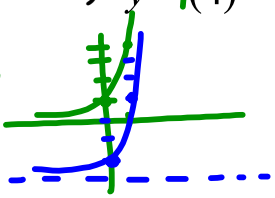
$3 = x$

Graph the equation as a tranformation of its parent function.

$y = ab^x$ (0,1)(1,b)

5) $y = 1(4)^x - 3$ (0,1)(1,4)

what will the -3 do to the exponential growth graph?



moved the graph down 3

6) Find the percent of decrease of:

$y = 2(0.65)^x$

1-?=.65

1-.35=.65

35% dec.

Aug 14-8:25 AM

8.3 Logarithmic Functions as Inverses

A logarithm is another way to write an exponent.

An exponent is written as $base^{exponent} = answer$

A logarithm is written as $\log_{base}\ answer = exponent$

Example

Exponent

$5^2 = 25$

drop criss cross

(base)

$\log_5 25 = 2$

Logarithm

$\log_5 25 = 2$

"log base 5 of 25 equals 2"

$5^2 = 25$

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Write each equation in logarithmic form.

Questions	Answers	Correct Answers
1. $2^4 = 16$	1. $\log_2 16 = 4$	1. $\log_2 16 = 4$
2. $4^5 = 1024$	2. $\log_4 1024 = 5$	2. $\log_4 1024 = 5$
3. $7^3 = 343$	3. $\log_7 343 = 3$	3. $\log_7 343 = 3$
4. $16^{\frac{1}{4}} = 2$	4. $\log_{16} 2 = \frac{1}{4}$	4. $\log_{16} 2 = \frac{1}{4}$
5. $5^3 = 125$	5. $\log_5 125 = 3$	5. $\log_5 125 = 3$

Aug 14-9:05 AM

If the base is not written in the log, it is automatically base 10

For example:

log 100 means $\log_{10}$ 100

So what is the value of log 100?

$\log_{10} 100 = x$

$10^x = 100$

$10^x = 10^2$

$x = 2$

Aug 14-10:23 AM

Evaluating Logarithmic equations

Evaluate
$\log_2 x = 3$

$2^3 = x$

$8 = x$

1st - Change to an exponential equation

2nd - Solve for x

Evaluate
$\log 10{,}000 = x$

$\log_{10} 10000 = x$

$10^x = 10^4$

$x = 4$

Aug 14-10:23 AM

Evaluate the following logarithmic equations and expressions.

$\log_2 32 = x$

$\log_2 2^5$

$2^x = 32$

$2^x = 2^5$

$x = 5$

5

$\log_5 125 = x$

$5^x = 125$

$5^x = 5^3$

$x = 3$

3

$\log_7 x = 2$

$7^2 = x$

49

$\log_{10} \frac{1}{100} = x$

$\log_{10} 100^{-1} = x$

$10^x = 10^{-2}$

$x = -2$

-2

$\log_{64} 8 = x$

$64^x = 8$

$8^{2x} = 8^1$

$2x = 1$

$x = \frac{1}{2}$

$\frac{1}{2}$

$\log_7 x = 0$

$7^0 = x$

$1 = x$

1

Aug 14-10:49 AM

Change the following logarithms to exponential equations.

Questions	Answers	Correct Answers
1. $\log_9 3 = \frac{1}{2}$	1. $9^{\frac{1}{2}} = 3$	1. $9^{\frac{1}{2}} = 3$
2. $\log_{10} 10 = 1$	2. $10^1 = 10$	2. $10^1 = 10$
3. $\log_4 64 = 3$	3. $4^3 = 64$	3. $4^3 = 64$
4. $\log_5 \frac{1}{25} = -2$	4. $5^{-2} = \frac{1}{25}$	4. $5^{-2} = \frac{1}{25}$
5. $\log_7 49 = 2$	5. $7^2 = 49$	5. $7^2 = 49$

Aug 14-9:05 AM

Remember the inverse of a function?

Find the inverse of $y = \log_5 x$

$x = \log_5 y$

$y = 5^x$

Step 1: Switch x and y.

Step 2: Solve for y by rewriting as exponential equation.

Aug 14-8:25 AM

GO COUGARS!

Logarithms Part 1

7-25 odd, 53-61 odd, 64-66, 70, 72

Aug 29-11:17 AM