WARM UP 2-17-16

Think back to last year and fill these in...

$81^{1/2} = \sqrt{81} = 9$

$49^{1/2} = \sqrt{49} = 7$

$10^{-1} = \frac{1}{10}$

$10^{-2} = \frac{1}{10^2} = \frac{1}{100}$

$9^{-1/2} = \frac{1}{\sqrt{9}} = \frac{1}{3}$

$x^{\frac{1}{n}} = \sqrt[n]{x}$

$a^{-1} = \frac{1}{a}$

Jan 24-11:08 AM

Questions 3.1??????

Feb 19-10:25 AM

3.2a Log Functions and their Graphs

Feb 15-1:07 PM

Example

Let's start with a puzzle. Take a guess at what these statements are trying to say.

[A] $power_5(25) = 2$ $5^2 = 25$

[B] $power_2(8) = 3$ $2^3 = 8$

[C] $power_3(27) = 3$ $3^3 = 27$

[D] $power_4(16) = 2$ $4^2 = 16$

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Example

Using what you discovered from the last example, fill in the blanks...

[A] $power_3(9) = 2$ $3^x = 9$

[B] $power_4(2) = \frac{1}{2}$ $4^x = 2$

[C] $power_9(81) = 2$ $9^x = 81$

[D] $power_2\left(\frac{1}{2}\right) = -1$ $2^x = \frac{1}{2}$

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The nasty little secret:

Mathematicians INSIST on calling this power function a "logarithmic function."

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$power_b(x)=y$ is the same as

$\log_b(x)=y$ is the same as

$b^y=x$

Logarithm and Exponentials are just inverses of each other!!

Restrictions on x: $x>0$

Restrictions on b: $b>0, b\neq 1$

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Evaluate the logarithm without a calculator

[A] $\log_{10} 10{,}000 = 4$ $10^x = 10000$

[B] $\log_{16} \frac{1}{4} = -\frac{1}{2}$ $16^x = \frac{1}{4}$ $16^{-1} = \frac{1}{\sqrt{16}}$ $\frac{1}{16^{\frac{1}{2}}}$

Evaluate the logarithm with a calculator

[C] $\log_{10} \frac{4}{5} = \log \frac{4}{5} = -0.0969$

[D] $1.9 \log_{10} 4.3 = 1.2036$

[E] $3 \ln 0.75 = -0.8630$

Alpha Window 5

Feb 15-1:18 PM

Convert from one log to exp and exp to log form...

$2^6 = 64$ $\log_2 64 = 6$

$4^1 = 4$ $\log_4 4 = 1$

$5^0 = 1$ $\log_5 1 = 0$

$5^{-2} = 0.04$ $\log_5 0.04 = -2$

$3^x = 81$ $\log_3 81 = x$

$x = 4$

p. 203, #1,5,15 (HW)

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FYI

$\log_{10} x$ Common Log: $\log x$

$\log_e x$ Natural Log: $\ln x$

weird.

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Special Properties of Logarithims

1) $\log_b b = 1$ because $b^1 = b$ $\log_x x = 1$

2) $\log_b 1 = 0$ because $b^0 = 1$ $\log_7 1 = 0$

3) $\log_b b^x = x$ because $b^x = b^x$ $\log_2 2^3 = 3$

4) $b^{\log_b x} = x$ because $\log_b x = \log_b x$ $27^{\log_{27}(3x)} = 3x$

5) If $\log_b x = \log_b y$, then $x = y$ because

$\log_9(4x-7) = \log_9(3x+8)$

$4x-7 = 3x+8$

p. 203, #33, 35, 37 (HW)

Jan 24-11:14 AM

HOMEWORK

...logs!

The underlined portion is what we covered today; Do this tonight and come with questions tomorrow!!!

3.2 (p203): 1-39 odd, 65-70 all; 43-51odd, 53-62all

Jan 24-11:14 AM

What Smarty Pants Invented Logarithms and...WHYYYYYY??

Mar 27-11:29 AM

8.0	0.9031	0.9036	0.9042	0.9047	0.9053	0.9058	0.9063	0.9069	0.9074	0.9079
8.1	0.9085	0.9090	0.9096	0.9101	0.9106	0.9112	0.9117	0.9122	0.9128	0.9133
8.2	0.9138	0.9143	0.9149	0.9154	0.9159	0.9165	0.9170	0.9175	0.9180	0.9186
8.3	0.9191	0.9196	0.9201	0.9206	0.9212	0.9217	0.9222	0.9227	0.9232	0.9238
8.4	0.9243	0.9248	0.9253	0.9258	0.9263	0.9269	0.9274	0.9279	0.9284	0.9289
8.5	0.9294	0.9299	0.9304	0.9309	0.9315	0.9320	0.9325	0.9330	0.9335	0.9340
8.6	0.9345	0.9350	0.9355	0.9360	0.9365	0.9370	0.9375	0.9380	0.9385	0.9390
8.7	0.9395	0.9400	0.9405	0.9410	0.9415	0.9420	0.9425	0.9430	0.9435	0.9440
8.8	0.9445	0.9450	0.9455	0.9460	0.9465	0.9469	0.9474	0.9479	0.9484	0.9489
8.9	0.9494	0.9499	0.9504	0.9509	0.9513	0.9518	0.9523	0.9528	0.9533	0.9538
9.0	0.9542	0.9547	0.9552	0.9557	0.9562	0.9566	0.9571	0.9576	0.9581	0.9586
9.1	0.9590	0.9595	0.9600	0.9605	0.9609	0.9614	0.9619	0.9624	0.9628	0.9633
9.2	0.9638	0.9643	0.9647	0.9652	0.9657	0.9661	0.9666	0.9671	0.9675	0.9680
9.3	0.9685	0.9689	0.9694	0.9699	0.9703	0.9708	0.9713	0.9717	0.9722	0.9727
9.4	0.9731	0.9736	0.9741	0.9745	0.9750	0.9754	0.9759	0.9763	0.9768	0.9773
9.5	0.9777	0.9782	0.9786	0.9791	0.9795	0.9800	0.9805	0.9809	0.9814	0.9818
9.6	0.9823	0.9827	0.9832	0.9836	0.9841	0.9845	0.9850	0.9854	0.9859	0.9863
9.7	0.9868	0.9872	0.9877	0.9881	0.9886	0.9890	0.9894	0.9899	0.9903	0.9908
9.8	0.9912	0.9917	0.9921	0.9926	0.9930	0.9934	0.9939	0.9943	0.9948	0.9952
9.9	0.9956	0.9961	0.9965	0.9969	0.9974	0.9978	0.9983	0.9987	0.9991	0.9996

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9.73×0.871

§Notice all our *x*'s are between 5.6 and 9.99 (this is not a complete chart—we're missing numbers 1 to 5.59)

- We're going to need to rewrite 0.871 as $8.71 \times 10^{?}$

§Since exponential and logarithmic functions are inverses of each other, we know that $10^{\log x} =$

- Convert to log form to convince yourself:

§So, $9.73 \times 8.71 \times 10^{-1} =$

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§Look up these logs to simplify:

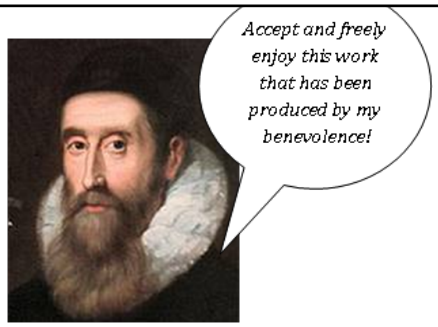
$10^{\log 9.73} \times 10^{\log 8.71} \times 10^{-1} =$

§Combine the exponents to get: (Remember, no calculators allowed!)

§Convert to log form:

§Now find which *x* corresponds to this log:

Mar 27-11:45 AM



Mar 27-11:56 AM

First edition of Napier's book; currently going for upwards of $30,000 online

Mar 27-11:57 AM

So why is it called a "logarithm" anyway?

LOGARITHM

from Greek *logos* and *arithmos*

logos: word, reasoning, ratio, proportion
arithmos: number

A logarithm is literally a "reasoning number"

Sources: mathforum.org and dictionary.com

Mar 27-11:58 AM