

# Logarithms for Humans

## SELF CHECK 5

It's another one!

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### Question 1 [Some points]

Here are some logarithmic expressions:

$\log_4(16)$	$\log_5(625)$	$\log_9(9)$	$\log_{96}(96^{0.5})$	$\log_3\left(\frac{1}{9}\right)$
$\log_{\frac{1}{2}}\left(\frac{1}{4}\right)$	$\log_{\frac{1}{2}}\left(\frac{1}{2}\right)$	$\log_{\frac{1}{2}}(1)$	$\log_{\frac{1}{2}}(4)$	$\log_{\frac{1}{2}}(2)$

- a) How many of these expressions evaluate to a positive number?
- b) How many of these expressions evaluate to a whole number, either positive, negative, or zero?

### Question 2 [Some more points]

Solving  $2^x + 2^{x+1} = 24$  is the same as solving which of these equations

- a)  $2^{2x+1} = 24$  (Don't choose this option.)
- b)  $2^x + 2 \cdot 2^x = 24$  (This answer is correct. And so is another option below.)
- c)  $2^x = 24$
- d)  $2^x = 8$

**Question 3 [20 points. (Why 20? No reason!)]**

The exact solution to  $3^x + 3^{x+1} = 360$  is ....

- a)  $x = \frac{\log_{10}(36)}{\log_3(3)}$       b)  $x = \frac{\log_{10}(360) - \log_{10}(10)}{\log_3(3)}$       c) Both of these      d) Neither of these

**Question 4 [200 points]**

These self-check questions are feeling ....

- a) harder      b) easier      c) whatever

**Question 5 [Any number of points you like]**

The statement “logarithms turn multiplication problems into addition problems” is referring to which of the following mathematical statements? (And it is the only statement that is correct!)

- a)  $\log_b(N + M) = \log_b(N) + \log_b(M)$
- b)  $\log_b(N + M) = \log_b(N) \times \log_b(M)$
- c)  $\log_b(N \times M) = \log_b(N) + \log_b(M)$
- d)  $\log_b(N \times M) = \log_b(N) \times \log_b(M)$

**Question 6 [3 points—the usual number of points for a question on an exam]**

What is the exact solution to  $5 \cdot 3^w = 2 \cdot 5^w$ ?

a)  $w = \frac{\log_{10}(5) - \log_{10}(3)}{\log_{10}(5) - \log_{10}(2)}$

b)  $w = \frac{\log_{10}(5) - \log_{10}(3)}{\log_{10}(2) - \log_{10}(5)}$

c)  $w = \frac{\log_{10}(3) - \log_{10}(5)}{\log_{10}(5) - \log_{10}(2)}$

d) Egad! All these options look scary and horrible!

**Answers:**

1. a) 6 b) 9 2. b), d) 3. c) 4. They feel harder to me! 5. c) 6. a) and d)!