Name: _____

F.IF.B.4: Evaluating Logarithmic Expressions

1 The expression $\log_8 64$ is equivalent to
1) 8
2) 2
3) $\frac{1}{2}$
4) $\frac{1}{8}$

2 The expression $\log_5\left(\frac{1}{25}\right)$ is equivalent to
1) $\frac{1}{2}$
2) 2
3) $-\frac{1}{2}$
4) -2

3 The loudness of sound is measured in units called decibels (dB). These units are measured by first assigning an intensity I_0 to a very soft sound that is called the threshold sound. The sound to be measured is assigned an intensity, I, and the decibel rating, d, of this sound is found using $d = 10\log\frac{I}{I_0}$.

The threshold sound audible to the average person is 1.0×10^{-12} W/m^2 (watts per square meter). Consider the following sound level classifications:

Moderate	45-69 dB
Loud	70-89 dB
Very loud	90-109 dB
Deafening	>110 dB

How would a sound with intensity 6.3×10^{-3} W/m^2 be classified?
1) moderate
2) loud
3) very loud
4) deafening

4 If $\log_9 81 = x$, find x.

5 Find the value of n: $\log_{100} 10{,}000 = n$

6 For what value of k will the graph of $y = \log_{10} x$ contain the point $(1, k)$?

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7 Complete the table below for the values of y for the equation $y = \log_2 x$.

x	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4
y					

8 If $x = \log_2 9$, find, to the *nearest tenth,* the value of x.

9 If $\log_3 5 = x$, find x to the *nearest tenth*.

10 Solve for x to the *nearest hundredth*: $\log_7 75 = x$

11 Find the value of $\log 58.43$ to four decimal places.

12 Find the value of log 429.7 correct to *four decimal places*.

13 Find $\log 742.6$ to the *nearest ten-thousandth*.

14 Find $\log 1985$ to *four* decimal places.

15 Find $\log 2001$ to the *nearest ten-thousandth*.

16 The scientists in a laboratory company raise amebas to sell to schools for use in biology classes. They know that one ameba divides into two amebas every hour and that the formula $t = \log_2 N$ can be used to determine how long in hours, *t,* it takes to produce a certain number of amebas, *N*. Determine, to the *nearest tenth of an hour,* how long it takes to produce 10,000 amebas if they start with one ameba.

17 The expression $\log_2(x-4)$ is undefined for all values of x such that
1) $x > 1$
2) $x > 0$
3) $x \leq 4$
4) $x \leq 0$

18 For which value of x is $y = \log x$ undefined?
1) 0
2) $\frac{1}{10}$
3) π
4) 1.483

19 The expression $\log_3(8-x)$ is defined for all values of x such that
1) $x > 8$
2) $x \geq 8$
3) $x < 8$
4) $x \leq 8$

F.IF.B.4: Evaluating Logarithmic Expressions
Answer Section

1 ANS: 2
$8^2 = 64$

REF: fall0909a2
2 ANS: 4 REF: 011124a2
3 ANS: 3
$d = 10\log\frac{6.3\times10^{-3}}{1.0\times10^{-12}} \approx 98$

REF: 011715aii
4 ANS:
2

REF: 068110siii
5 ANS:
2

REF: 019407siii
6 ANS:
0

REF: 088508siii
7 ANS:

x	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4
y	-2	-1	0	1	2

REF: 019742siii
8 ANS:
3.2

REF: 018941siii
9 ANS:
1.5

REF: 088637siii
10 ANS:
2.22

REF: 089940siii

11 ANS:
1.7666

REF: 018412siii

12 ANS:
2.6332

REF: 068114siii

13 ANS:
2.8708

REF: 018503siii

14 ANS:
3.2978

REF: 068507siii

15 ANS:
3.3012

REF: 088613siii

16 ANS:

$$t = \log_2 10000$$

$$2^t = 10000$$

13.3. $\log 2^t = \log 10000$

$$t \log 2 = \log 10000$$

$$t = \frac{\log 10000}{\log 2} \approx 13.3$$

REF: 060125b

17 ANS: 3 REF: fall9904b

18 ANS: 1 REF: 060301b

19 ANS: 3 REF: 010412b