Name: _____

F.IF.B.4: Evaluating Logarithmic Expressions

1   The expression $\log_8 64$ is equivalent to

   1)   8

   2)   2

   3) $\dfrac{1}{2}$

   4) $\dfrac{1}{8}$

2   The expression $\log_5\left(\dfrac{1}{25}\right)$ is equivalent to

   1) $\dfrac{1}{2}$

   2)   2

   3) $-\dfrac{1}{2}$

   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 $d = 10\log\dfrac{I}{I_0}$. 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
Defeaning	>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 $(1,k)$?

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

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

Name: _____

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   Evaluate $e^{x \ln y}$ when $x = 3$ and $y = 2$.

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

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

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

$d = 10 \log \dfrac{6.3 \times 10^{-3}}{1.0 \times 10^{-12}} \approx 98$

REF: 011715aii

4 ANS:
   2

REF: 068110siii

5 ANS:
   2

REF: 019407siii

6 ANS:
   0

REF: 088508siii

7 ANS:

x	$\dfrac{1}{4}$	$\dfrac{1}{2}$	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:

$$t = \log_2 10000$$
$$2^t = 10000$$
$$13.3. \quad \log 2^t = \log 10000$$
$$t \log 2 = \log 10000$$
$$t = \frac{\log 10000}{\log 2} \approx 13.3$$

REF: 060125b

17 ANS:

$$e^{3\ln 2} = e^{\ln 2^3} = e^{\ln 8} = 8$$

REF: 061131a2

18 ANS: 3   REF: fall9904b
19 ANS: 3   REF: 010412b