F.BF.B.5: Logarithmic Equations 1

1 If $\log_4 x = 3$, then x is equal to

1) 7
2) 12
3) 64
4) 81

2 If $\log_5 x = 2$, what is the value of $\sqrt{x}$?

1) $2^{\frac{2}{5}}$
2) $\sqrt{5}$
3) 5
4) 25

3 What is the value of x in the equation $\log_5 x = 4$?

1) 1.16
2) 20
3) 625
4) 1,024

4 If $\log_2(x^2 - 1) = \log_2 8$, then the solution set for x is

1) $\{3, -3\}$
2) $\{-3\}$
3) $\{3\}$
4) $\{\ \}$

5 If $\log_4 x = 3$, find x.

6 If $\log_2 m = 5$, find the value of m.

7 If $\log_4 x = 2$, find x.

8 Find the value of x that satisfies the equation $\log_3 x = 4$.

9 Solve for x: $\log_2(x + 1) = 3$

10 Solve for x: $\frac{1}{2}\log(x + 2) = 2$

11 If $\log N = 3.8609$, find the value of N, to the *nearest integer*.

12 The relationship between the relative size of an earthquake, S, and the measure of the earthquake on the Richter scale, R, is given by the equation $\log S = R$. If an earthquake measured 3.2 on the Richter scale, what was its relative size to the *nearest hundredth*?

13 Solve for the positive value of x: $\log_x 9 = 2$

14 Solve for x: $\log_x 36 = 2$

15 If $\log_n 8 = 3$, find the value of n.

16 Solve for x: $\log_x 125 = 3$

17 Solve algebraically for all values of x: $\log_{(x+4)}(17x - 4) = 2$

18 If $\log_{(x+1)} 27 = 3$, find the value of x.

19 If $\log_{(x+1)} 64 = 3$, find the value of x.

20 Solve algebraically for x: $\log_{x+3} \frac{x^3 + x - 2}{x} = 2$

21 Solve for x to the *nearest tenth*: $\log_x 5 = 3$

22 The solution of $\log_x 8 = 2$ is

1) $x < 2$
2) $2 < x < 3$
3) $3 < x < 4$
4) $x > 4$

23 Solve algebraically for the *exact* value of x: $\log_8 16 = x + 1$

F.BF.B.5: Logarithmic Equations 1
Answer Section

1 ANS: 3 REF: 019920siii

2 ANS: 3

$\log_5 x = 2$

$x = 5^2$

$x = 25$

$\sqrt{x} = 5$

REF: 010519b

3 ANS: 3

$x = 5^4 = 625$

REF: 061106a2

4 ANS: 1 REF: 069919siii

5 ANS:
64

REF: 068017siii

6 ANS:
32

REF: 018508siii

7 ANS:
16

REF: 060206siii

8 ANS:
81

REF: 080307siii

9 ANS:

$\log_2(x+1) = 3$

$x + 1 = 2^3$

$x = 7$

REF: 060623b

10 ANS:
9998

REF: 019442siii

11 ANS:
7259

REF: 088715siii

12 ANS:

$\log_{10} S = 3.2$

$S = 10^{3.2} \approx 1584.89$

REF: 010324b

13 ANS:

3

REF: 018703siii

14 ANS:

6

REF: 068904siii

15 ANS:

2

REF: 089813siii

16 ANS:

5

REF: 069604siii

17 ANS:

$(x+4)^2 = 17x - 4$

$x^2 + 8x + 16 = 17x - 4$

$x^2 - 9x + 20 = 0$

$(x-4)(x-5) = 0$

$x = 4, 5$

REF: 011336a2

18 ANS:

2

REF: 069004siii

19 ANS:

$(x+1)^3 = 64$

$x + 1 = 4$

$x = 3$

REF: 061531a2

20 ANS:

$x = -\frac{1}{3}, -1 \quad \log_{x+3} \frac{x^3 + x - 2}{x} = 2$

$$\frac{x^3 + x - 2}{x} = (x+3)^2$$

$$\frac{x^3 + x - 2}{x} = x^2 + 6x + 9$$

$$x^3 + x - 2 = x^3 + 6x^2 + 9x$$

$$0 = 6x^2 + 8x + 2$$

$$0 = 3x^2 + 4x + 1$$

$$0 = (3x+1)(x+1)$$

$$x = -\frac{1}{3}, -1$$

REF: 081039a2

21 ANS:
1.7

REF: 018439siii

22 ANS: 2 REF: 080228siii

23 ANS:

$$8^{x+1} = 16$$

$$2^{3(x+1)} = 2^4$$

$$3x + 3 = 4$$

$$3x = 1$$

$$x = \frac{1}{3}$$

REF: 011630a2