

A2.A.28: Logarithmic Equations 1: Solve a logarithmic equation by rewriting as an exponential equation

- 1 The equation $\log_a x = y$ where $x > 0$ and $a > 1$ is equivalent to
 - 1) $x^y = a$
 - 2) $y^a = x$
 - 3) $a^y = x$
 - 4) $a^x = y$
- 2 The function $y = 2^x$ is equivalent to
 - 1) $x = y \log 2$
 - 2) $x = \log_2 y$
 - 3) $y = x \log 2$
 - 4) $y = \log_2 x$
- 3 If $\log_4 x = 3$, then x is equal to
 - 1) 7
 - 2) 12
 - 3) 64
 - 4) 81
- 4 If $\log_5 x = 2$, what is the value of \sqrt{x} ?
 - 1) $2^{\frac{2}{5}}$
 - 2) $\sqrt{5}$
 - 3) 5
 - 4) 25
- 5 What is the value of x in the equation $\log_5 x = 4$?
 - 1) 1.16
 - 2) 20
 - 3) 625
 - 4) 1,024
- 6 If $\log_2(x^2 - 1) = \log_2 8$, then the solution set for x is
 - 1) $\{3, -3\}$
 - 2) $\{-3\}$
 - 3) $\{3\}$
 - 4) $\{\}$
- 7 If $\log_4 x = 3$, find x .
- 8 If $\log_2 m = 5$, find the value of m .
- 9 If $\log_4 x = 2$, find x .
- 10 Find the value of x that satisfies the equation $\log_3 x = 4$.
- 11 Solve for x : $\log_2(x + 1) = 3$

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

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

13 If $\log N = 3.8609$, find the value of N .

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

14 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?

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

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

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

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

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

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

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

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

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

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

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Answer Section

- 1 ANS: 3 REF: 011503a2
 2 ANS: 2 REF: 080607b
 3 ANS: 3 REF: 019920siii
 4 ANS: 3 REF: 010519b
 5 ANS: 3
 $x = 5^4 = 625$

REF: 061106a2

- 6 ANS: 1 REF: 069919siii
 7 ANS:
 64

REF: 068017siii

- 8 ANS:
 32

REF: 018508siii

- 9 ANS:
 16

REF: 060206siii

- 10 ANS:
 81

REF: 080307siii

- 11 ANS:
 7

REF: 060623b

- 12 ANS:
 9998

REF: 019442siii

- 13 ANS:
 7260

REF: 088715siii

- 14 ANS:
 1,584.89

REF: 010324b

15 ANS:
3

REF: 018703siii

16 ANS:
6

REF: 068904siii

17 ANS:
2

REF: 089813siii

18 ANS:
5

REF: 069604siii

19 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

20 ANS:
2

REF: 069004siii

21 ANS:

$$(x + 1)^3 = 64$$

$$x + 1 = 4$$

$$x = 3$$

REF: 061531a2

22 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

23 ANS:

1.7

REF: 018439siii

24 ANS: 2

REF: 080228siii

25 ANS:

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

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

$$3x + 3 = 4$$

$$3x = 1$$

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

REF: 011630a2