

A2.A.28: Logarithmic Equations 2: Solve a logarithmic equation by rewriting as an exponential equation

- 1 If $\log_2 x = -3$, then x is equal to
 - 1) 9
 - 2) -6
 - 3) $\frac{1}{8}$
 - 4) -8
- 2 What is the solution of the equation $2\log_4(5x) = 3$?
 - 1) 6.4
 - 2) 2.56
 - 3) $\frac{9}{5}$
 - 4) $\frac{8}{5}$
- 3 If $\log_8 x = \frac{2}{3}$, find the value of x .
- 4 Solve for x : $\log_8(x+1) = \frac{2}{3}$
- 5 Find x if $\log_9 x = \frac{3}{2}$.
- 6 Solve algebraically for x : $\log_{27}(2x-1) = \frac{4}{3}$
- 7 If $\log_x 9 = -2$, what is the value of x ?
 - 1) 81
 - 2) $\frac{1}{81}$
 - 3) 3
 - 4) $\frac{1}{3}$
- 8 If $\log_x 5 = \frac{1}{2}$, find the value of x .
- 9 Solve algebraically for x : $\log_{5x-1} 4 = \frac{1}{3}$
- 10 If $\log_x \frac{1}{4} = -1$, find x .
- 11 If $\log_x \frac{1}{4} = -2$, find x .
- 12 If $\log_4 x = 2.5$ and $\log_y 125 = -\frac{3}{2}$, find the numerical value of $\frac{x}{y}$, in simplest form.
- 13 The temperature, T , of a given cup of hot chocolate after it has been cooling for t minutes can best be modeled by the function below, where T_0 is the temperature of the room and k is a constant.
$$\ln(T - T_0) = -kt + 4.718$$

A cup of hot chocolate is placed in a room that has a temperature of 68° . After 3 minutes, the temperature of the hot chocolate is 150° . Compute the value of k to the nearest thousandth. [Only an algebraic solution can receive full credit.] Using this value of k , find the temperature, T , of this cup of hot chocolate if it has been sitting in this room for a total of 10 minutes. Express your answer to the *nearest degree*. [Only an algebraic solution can receive full credit.]

A2.A.28: Logarithmic Equations 2: Solve a logarithmic equation by rewriting as an exponential equation

Answer Section

1 ANS: 3 REF: 088624siii

2 ANS: 4 REF: fall0921a2

3 ANS:
4

REF: 068404siii

4 ANS:
3

REF: 060925b

5 ANS:
27

REF: 018407siii

6 ANS:

$$2x - 1 = 27^{\frac{4}{3}}$$

$$2x - 1 = 81$$

$$2x = 82$$

$$x = 41$$

REF: 061329a2

7 ANS: 4 REF: 010819b

8 ANS:
25

REF: 068813siii

9 ANS:

$$(5x - 1)^{\frac{1}{3}} = 4$$

$$5x - 1 = 64$$

$$5x = 65$$

$$x = 13$$

REF: 061433a2

10 ANS:
4

REF: 089006siii

11 ANS:
2

REF: 019818siii

12 ANS:

$$800. \quad x = 4^{2.5} = 32. \quad y^{-\frac{3}{2}} = 125 \quad . \quad \frac{x}{y} = \frac{32}{\frac{1}{25}} = 800$$

$$y = 125^{-\frac{2}{3}} = \frac{1}{25}$$

REF: 011237a2

13 ANS:

$$\ln(T - T_0) = -kt + 4.718 \quad . \quad \ln(T - 68) = -0.104(10) + 4.718.$$

$$\ln(150 - 68) = -k(3) + 4.718 \quad \ln(T - 68) = 3.678$$

$$4.407 \approx -3k + 4.718 \quad T - 68 \approx 39.6$$

$$k \approx 0.104 \quad T \approx 108$$

REF: 011139a2