

Rewrite the following in log form.

1. $11 = 2^x$

$$\log_2 11 = x$$

$2^x = 11$

2. $x^4 = 12$

$$\log_x 12 = 4$$

3. $12 = q^x$

$$\log_q 12 = x \quad (q^x = 12)$$

4. $10^{-3} = \frac{1}{1000}$

$$\log_{10} \frac{1}{1000} = -3$$

Rewrite the following in exponential form.

5. $\log_3 a = b$

$$3^b = a$$

7. $\log 5 = x$

$$10^x = 5$$

6. $\log_{10} 21 = x$

$$10^x = 21$$

8. $\log_x 125 = 3$

$$x^3 = 125$$

Evaluate the following.

9. $\log_3 81 = x$

$$3^x = 81 = 3^4$$

10. $\log_{10} 100 = x$

$$2$$

$$10^x = 100 = 10^2$$

11. $5^{\log_5 7} = x$

$$7$$

12. $\log_4 \frac{1}{16} = x$

$$-2$$

$$4^x = \frac{1}{16} = \frac{1}{4^2} = 4^{-2}$$

Solve the following.

13. $\log_2 x = 8$

$$256$$

$$2^8 = x$$

14. $\log_3 (2x - 3) = \log_3 (6x - 27)$

$$x = 6$$

$$2x - 3 = 6x - 27$$

$$24 = 4x$$

15. $2^{2x} = 8$

$$x = \frac{3}{2}$$

$$2^{2x} = 2^3$$

16. $3^x = 27^{x+1}$

$$x = \frac{-3}{2}$$

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

$$x = 3x + 3$$

$$-3x - 3x$$

$$-2x = 3$$

17. $\log_2 (3x + 1) = 4$

$$x = 5$$

$$2^4 = 3x + 1 \quad | \quad 15 = 3x$$

$$16 = 3x + 1 \quad | \quad x = 5$$

$$-1 \quad -1$$

18. $\ln(x^2 + 5x) = \ln(3x + 24)$

$$x = 4, -6$$

$$x^2 + 5x = 3x + 24$$

$$-3x \quad -3x$$

$$x^2 + 2x - 24 = 0 = (x - 4)(x + 6)$$

Use the change of base rule to evaluate the following. Round to the nearest hundredth.

19. $\log_5 12$

$$1.54$$

$$\frac{\log 12}{\log 5}$$

20. $\log_3 8$

$$1.89$$

$$\frac{\log 8}{\log 3}$$

$$x = 4, -6$$

SHOW WORK FOR CREDIT!! CIRCLE ANSWERS!!

1. Write the following in log form:

a. $3^x = 27$

$$\log_3 27 = x$$

b. $e^x = 10$

$$\ln_e 10 = x$$

c. $a^n = 256$

$$\log_a 256 = n$$

2. Write the following in exponential form:

a. $\log_2 x = -6$

$$2^{-6} = x$$

b. $\log_4 x = 5$

$$4^5 = x$$

c. $\ln 32 = x$

$$e^x = 32$$

d. $\log_{10} 110 = x$

$$10^x = 110$$

3. Evaluate each expression without a calculator.

a. $\log_3 81 = x$

$$3^x = 81 = 3^4$$

$$x = 4$$

b. $\log_6 1 = x$

$$6^x = 1$$

$$6^x = 6^0$$

$$x = 0$$

c. $\log_5 5^{4x} = a$

$$5^a = 5^{4x}$$

$$4x$$

d. $\log_8 2 = x$

$$8^x = 2^1$$

$$(2^3)^x = 2^1$$

$$3x = 1$$

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

4. Evaluate each expression with a calculator—round to 3 decimal places.

a. $\log 33 = 1.519$

$$\frac{\log 33}{\log 10}$$

b. $\log_6 42$

$$\frac{\log 42}{\log 6} = 2.086$$

c. $\ln 78$

$$\ln 78 = 4.357$$

d. $\log_4 87$

$$\frac{\log 87}{\log 4} = 3.221$$

5. Solve following equations.

a. $\log_8 x = 3$

$$8^3 = x$$

$$512 = x$$

b. $\log_4 2c = \log_4 (c + 6)$

$$2c = c + 6$$

$$-c \quad -c$$

$$c = 6$$

c. $\log_6 (x^2) = \log_6 (-5x + 14)$

$$x^2 = -5x + 14$$

$$x^2 + 5x - 14 = 0$$

$$(x - 2)(x + 7) = 0$$

$$x = 2, -7$$