

## Log Test Review

Rewrite each equation in exponential form.

1)  $\log_x \frac{5}{16} = y$

$$x^y = \frac{5}{16}$$

2)  $\log_{14} 123 = k$

$$14^k = 123$$

Rewrite each equation in logarithmic form.

3)  $20^2 = 400$

$$\log_{20} 400 = 2$$

4)  $x^{-\frac{7}{5}} = y$

$$\log_x y = -\frac{7}{5}$$

Evaluate each expression.

5)  $\log_4 \frac{1}{64}$

$$x = -3$$

6)  $\log_7 1$

$$x = 0$$

7)  $\log_2 16$

$$x = 4$$

8)  $\log_{49} 7$

$$x = \frac{1}{2}$$

9)  $\log_{216} 6$

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

10)  $\log_6 36$

$$x = 2$$

11)  $\log_2 64$

$$x = 6$$

12)  $\log_7 \frac{1}{343}$

$$x = -3$$

Expand each logarithm.

13)  $\log_3 \left( \frac{a^5}{b} \right)^4$

$20 \log_3 a - 4 \log_3 b$

14)  $\log_4 (x \cdot y \cdot z^5)$

$\log_4 x + \log_4 y + 5 \log_4 z$

Condense each expression to a single logarithm.

15)  $3 \log_5 x - 6 \log_5 y$

$\log_5 \left( \frac{x^3}{y^6} \right)$

16)  $12 \log_4 x + 3 \log_4 y$

$\log_4 (x^{12} y^3)$

Solve each equation.

17)  $\log_7 (5x - 10) = \log_7 (4x - 3)$

$5x - 10 = 4x - 3$

$x = 7 \checkmark$

18)  $\log_{15} (45 + x^2) = \log_{15} (2x^2 - 4x)$

$45 + x^2 = 2x^2 - 4x$

$0 = x^2 - 4x - 45$

$0 = (x - 9)(x + 5)$

$x = 9 \checkmark \quad x = -5 \checkmark$

19)  $\log_3 (3k^2 + 18k) = \log_3 (-81 + 2k^2)$

$3k^2 + 18k = -81 + 2k^2$

$k^2 + 18k + 81 = 0$

$(k + 9)(k + 9) = 0$

$k = -9 \checkmark$

20)  $-10 + \log_8 x = -10$

$\log_8 x = 0$

$8^0 = x \quad x = 1$

21)  $-9 \log_4 8x = -9$

$\log_4 8x = 1$

$4 = 8x$

$\frac{1}{2} = x$

22)  $\log_8 (9r + 10) = 1$

$8^1 = 9r + 10$

$-2 = 9r$

$-\frac{2}{9} = r \checkmark$

23)  $\log_6 3 + \log_6 (x^2 + 3) = 2$

$\log_6 (3x^2 + 9) = 2 \rightarrow 0 = 3x^2 - 27$

$0 = x^2 - 9$

$x = \pm 3 \checkmark$

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

$0 = 3x^2 + 9 - 36$

-2-

24)  $\log_2 10 - \log_2 4x = 3$

$\log_2 \frac{10}{4x} = 3$

$2^3 = \frac{10}{4x}$

$32x = 10$

$x = \frac{10}{32} = \frac{5}{16}$