

Section 6.3

Expand each logarithm.

1) $\log_7 (w^4 \sqrt{u})$

2) $\log_7 (uv^6)^6$

3) $\log_2 \left(\frac{12^2}{5} \right)^2$

4) $\log_6 \left(\frac{x^4}{y} \right)^3$

Condense each expression to a single logarithm.

5) $2\log_2 u + 5\log_2 v$

6) $3\log_9 x + 6\log_9 y$

7) $16\log_3 x - 4\log_3 y$

8) $6\log_9 7 + \frac{\log_9 6}{2}$

Solve each equation.

9) $\log_6 (5x - 7) = \log_6 (4x - 5)$

10) $\log_2 (-n + 8) = \log_2 (3n + 2)$

11) $\log_7 n = \frac{2}{3} \cdot \log_7 8$

12) $-10\log_7 (b - 1) = -40$

$$13) \log_9 (3n + 14) - \log_9 5 = \log_9 2n$$

$$14) 8 + \log_9 (x - 5) = 10$$

$$15) -7 + \log_2 (n - 5) = -8$$

$$16) \log_8 (n - 3) + \log_8 (n + 4) = 1$$

$$17) \log_4 (x^2 - 4) - \log_4 (x + 2) = \log_4 1$$

$$18) -3 \log (a + 8) = 0$$

$$19) \log_7 (x + 3) - \log_7 4 = 1$$

$$20) \log_9 x - \log_9 (x - 2) = 1$$

$$21) \log_7 (x - 8) - \log_7 6 = 1$$

$$22) \log_6 (x^2 - 5) + \log_6 9 = 2$$

$$23) \log x + \log (x + 3) = 1$$

$$24) \log_2 (x + 1) + \log_2 x = 1$$

$$25) \log_7 (x + 7) + \log_7 6 = 2$$

$$26) \log 2 + \log 4x = 3$$

$$27) \log_5 10 + \log_5 12 = 3 \log_5 2 + \log_5 a$$

$$28) \log x + \log (3x - 5) = \log 2$$

$$29) 3 \log_5 (x^2 + 9) - 6 = 0$$

$$30) \log_6 (2x - 5) + 1 = \log_6 (7x + 10)$$

Section 6.3

Date _____ Period _____

Expand each logarithm.

1) $\log_7 (w^4 \sqrt{u})$

$$\log_7 w^4 + \log_7 \sqrt{u}$$

$$4 \log_7 w + \frac{1}{2} \log_7 u$$

3) $\log_2 \left(\frac{12^2}{5} \right)^2$

$$\log_2 \frac{12^4}{5^2} = \log_2 12^4 - \log_2 5^2$$

$$4 \log_2 12 - 2 \log_2 5$$

2) $\log_7 (uv^6)^6$

$$\log_7 u^6 v^{36}$$

$$(\log_7 u^6 + \log_7 v^{36})$$

$$6 \log_7 u + 36 \log_7 v$$

4) $\log_6 \left(\frac{x^4}{y} \right)^3$

$$\log_6 \frac{x^{12}}{y^3} = \log_6 x^{12} - \log_6 y^3$$

$$12 \log_6 x - 3 \log_6 y$$

Condense each expression to a single logarithm.

5) $2 \log_2 u + 5 \log_2 v$

$$\log_2 u^2 + \log_2 v^5$$

$$\log_2 u^2 v^5$$

6) $3 \log_9 x + 6 \log_9 y$

$$\log_9 x^3 + \log_9 y^6$$

$$\log_9 x^3 y^6$$

7) $16 \log_3 x - 4 \log_3 y$

$$\log_3 x^{16} - \log_3 y^4$$

$$\log_3 \frac{x^{16}}{y^4}$$

8) $6 \log_9 7 + \frac{\log_9 6}{2}$

$$\log_9 7^6 + \log_9 6^{\frac{1}{2}}$$

$$\log_9 7^6 \sqrt{6}$$

Solve each equation.

9) $\log_6 (5x - 7) = \log_6 (4x - 5)$

$$5x - 7 = 4x - 5$$

$$x = 2$$

10) $\log_2 (-n + 8) = \log_2 (3n + 2)$

$$-n + 8 = 3n + 2$$

$$6 = 4n$$

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

11) $\log_7 n = \frac{2}{3} \cdot \log_7 8$

$$n = 8^{\frac{2}{3}}$$

$$n = (\sqrt[3]{8})^2 = 4$$

12) $-10 \log_7 (b - 1) = -40$

$$\log_7 (b - 1) = 4$$

$$b - 1 = 7^4$$

$$b = 2402$$

13) $\log_9 (3n + 14) - \log_9 5 = \log_9 2n$

$\frac{3n+14}{5} = 2n$ $n=2$
 $3n+14 = 10n$

15) $-7 + \log_2 (n+5) = -8$

$\log_2 (n+5) = -1$ $n=5\frac{1}{2}$
 $n+5 = 2^{-1}$
 $n+5 = \frac{1}{2}$

17) $\log_4 (x^2 - 4) - \log_4 (x+2) = \log_4 1$

$\frac{x^2-4}{x+2} = 1$ $x^2-4 = x+2$
 $x^2-x-6 = 0$
 $(x-3)(x+2) = 0$
 $x=3, -2$

19) $\log_7 (x+3) - \log_7 4 = 1$

$\log_7 \frac{x+3}{4} = 1$
 $\frac{x+3}{4} = 7$ $x+3 = 28$
 $x = 25$

21) $\log_7 (x-8) - \log_7 6 = 1$

$\log_7 \frac{x-8}{6} = 1$ $x-8 = 42$
 $\frac{x-8}{6} = 7$ $x = 50$

23) $\log x + \log (x+3) = 1$

$\log x(x+3) = 1$ $(x+5)(x-2)$
 $x^2 + 3x = 10$ $x = -5, 2$
 $x^2 + 3x - 10 = 0$ $x = 2$

25) $\log_7 (x+7) + \log_7 6 = 2$

$\log_7 6(x+7) = 2$ $x = \frac{7}{6}$
 $6x+42 = 7^2$
 $6x = 7$

27) $\log_5 10 + \log_5 12 = 3 \log_5 2 + \log_5 a$

$\log_5 120 = \log_5 2^3 a$
 $120 = 8a$ $a = 15$

29) $3 \log_5 (x^2 + 9) - 6 = 0$

$3 \log_5 (x^2 + 9) = 6$ $x = 4$
 $\log_5 (x^2 + 9) = 2$
 $x^2 + 9 = 5^2$
 $x^2 = 16$

14) $8 + \log_9 (x-5) = 10$

$\log_9 (x-5) = 2$
 $x-5 = 9^2$
 $x = 86$

16) $\log_8 (n-3) + \log_8 (n+4) = 1$

$\log_8 (n-3)(n+4) = 1$ $(n+5)(n+4)$
 $n^2 + n - 12 = 8$ $n = 4, -8$
 $n^2 + n - 20 = 0$

18) $-3 \log (a+8) = 0$

$\log (a+8) = 0$ $a = -7$
 $a+8 = 10^0$
 $a+8 = 1$

20) $\log_9 x - \log_9 (x-2) = 1$

$\log_9 \frac{x}{x-2} = 1$ $x = 9(x-2)$
 $\frac{x}{x-2} = 9$ $x = 9x - 18$
 $-8x = -18$
 $x = \frac{9}{4}$

22) $\log_6 (x^2 - 5) + \log_6 9 = 2$

$\log_6 9(x^2-5) = 2$ $x^2 = 9$
 $9x^2 - 45 = 6^2$ $x = \pm 3$
 $9x^2 = 81$

24) $\log_2 (x+1) + \log_2 x = 1$

$\log_2 x(x+1) = 1$ $(x+2)(x-1) = 0$
 $x^2 + x = 2$ $x = 1, -2$
 $x^2 + x - 2 = 0$

26) $\log 2 + \log 4x = 3$

$\log 2(4x) = 3$
 $8x = 10^3$ $x = 125$

28) $\log x + \log (3x-5) = \log 2$

$\log x(3x-5) = \log 2$ $x = 2$
 $3x^2 - 5x = 2$
 $3x^2 - 5x - 2 = 0$ $(3x+1)(x-2)$

30) $\log_6 (2x-5) + 1 = \log_6 (7x+10)$

$\log_6 (7x+10) - \log_6 (2x-5) = 1$
 $\log_6 \frac{7x+10}{2x-5} = 1$
 $\frac{7x+10}{2x-5} = 6$ $x =$