Unit 5 Test 1 Review (Solving) Name _____

Rewrite each equation in exponential form.

1) $\log_n m = -15$ $n^{-15} = m$

2) $\log_x 41 = -1$ $x^{-1} = 41$

Rewrite each equation in logarithmic form.

3) $x^7 = y$ $\log_x y = 7$

4) $y^x = 164$ $\log_y 164 = x$

You may use a calculator to evaluate each expression. Round each answer to 2 decimal places where necessary.

5) $\log_{64} \frac{1}{2}$ $-.17$

6) $\log_6 216$ 3

7) $\log_5 54$ 2.48

8) $\log_3 7$ 1.77

Expand each logarithm.

9) $\log_9 \left(\frac{a^4}{b}\right)^6$ $6\left[4\log_9 a - \log_9 b\right]$

10) $\log_5 \frac{a^5}{b^3}$ $5\log_5 a - 3\log_5 b$

11) $\log_6 (u^3 v^5)$ $3\log_6 u + 5\log_6 v$

12) $\log_6 (uv^5)^5$ $5\left[\log_6 u + 5\log_6 v\right]$

Condense each expression to a single logarithm.

13) $5\log_3 x + 2\log_3 y$ $\log_3 (x^5 y^2)$

14) $3\log_3 a - 2\log_3 b$ $\log_3 \left(\frac{a^3}{b^2}\right)$

15) $9\log_3 x - 3\log_3 y$ $\log_3 \left(\frac{x^9}{y^3}\right)$

16) $\log_2 a + \log_2 b + 2\log_2 c$ $\log_2 (abc^2)$

Solve each equation.

17) $4^{2x-2} = 4^{1-x}$

$2x-2=1-x$

$+x \quad +x$

$3x-2=1$

$3x=3$

$x=1$

18) $5^{-3x-2} = 5^{-x}$

$-3x-2=-x$

$+3x \quad +3x$

$-2=2x$

$x=-1$

19) $16^{3x} = 64^{3-2x}$

$4^{2(3x)} = 4^{3(3-2x)}$

$6x = 9-6x$

$+6x \quad +6x$

$12x=9$

$x=9/12$ or $3/4$

20) $64^{x-3} = 16^{-2x}$

$4^{3(x-3)} = 4^{2(-2x)}$

$3x-9=-4x$

$-3x \quad -3x$

$-9=-7x$

$x=\frac{9}{7}$

21) $8^x = 60$

$\log 8^x = \log 60$

$x = \frac{\log 60}{\log 8}$

$x \approx 1.97$

22) $2^x = 49$

$\log 2^x = \log 49$

$x = \frac{\log 49}{\log 2}$

$x \approx 5.61$

23) $\frac{2}{2} \cdot 5^{x+2} = \frac{33}{2}$

$5^{x+2} = 16.5$

$\log x+2 = \frac{\log 16.5}{\log 5}$

$x+2=1.7$

$-2 \quad -2$

$x \approx -.3$

24) $7^{10x} + 9 = 33$

$-9 \quad -9$

$7^{10x} = 24$

$10x = \frac{\log 24}{\log 7}$

$10x = 1.63$

$x \approx .16$

25) $\log_4 (3x+6) = \log_4 (-5x+9)$

$3x+6=-5x+9$

$+5x \quad +5x$

$8x+6=9$

$-6 \quad -6$

$8x=3$

$x=3/8$

26) $\log_5 (x+9) = \log_5 -2x$

$x+9=-2x$

$-x \quad -x$

$9=-3x$

$x=-3$

$\log_7 2 - \log_7 x = \log_7 42$

$\log_7 \frac{2}{x} = \log_7 42$

$\frac{2}{x} = \frac{42}{1}$

$42x = 2$ $\quad x = 2/42 = 1/21$

28) $\log_6 4 - \log_6 x = \log_6 28$

$\log_6 \frac{4}{x} = \log_6 28$

$\frac{4}{x} = \frac{28}{1}$

$28x = 4$

$x = 4/28 = 1/7$

29) $\log_3 x - \log_3 10 = 1$

$\log_3 \frac{x}{10} = 1$

$\frac{3^1}{1} = \frac{x}{10}$

$x = 30$

30) $\log_7 6 - \log_7 x = 2$

$\log_7 \frac{6}{x} = 2$

$\frac{7^2}{1} = \frac{6}{x}$ $\qquad \frac{49}{1} = \frac{6}{x}$

$49x = 6$

$x = 6/49$

31) $\log_9 (x-9) + \log_9 4 = \log_9 44$

$\log_9 4(x-9) = \log_9 44$

$4x - 36 = 44$

$4x = 80$

$x = 20$

32) $\log_5 -3x + \log_5 2 = 2$

$\log_5 -6x = 2$

$5^2 = -6x$

$25 = -6x$

$x = \frac{25}{-6}$

33) $\log_6 -2x - \log_6 5 = \log_6 37$

$\log_6 \left(\frac{-2x}{5}\right) = \log_6 37$

$\frac{-2x}{5} = \frac{37}{1}$

$-2x = 185$

$x = \frac{-185}{2}$ or -92.5

34) $\log_7 6 - \log_7 (x-1) = 2$

$\log_7 \frac{6}{x-1} = 2$

$\frac{7^2}{1} = \frac{6}{x-1}$

$49(x-1) = 6$

$49x - 49 = 6$

$49x = 55$

$x = \frac{55}{49}$

35) $\log_{11} x = 3$

$11^3 = x$

1331

36) $\log_{12} x = 4$

$12^4 = x$

$x = 20736$

37) $\log_9 -8x - 7 = -7$

$+7 \quad +7$

$\log_9 -8x = 0$

$9^0 = -8x$

$1 = -8x$

$x = -\frac{1}{8}$

38) $-2 \log_4 8x = 2$

$\frac{}{-2} \quad \frac{}{-2}$

$\log_4 8x = -1$

$4^{-1} = 8x$

$\frac{1}{4} = 8x$

$\frac{1}{32} = x$

Round your answer to the nearest cent value.

39) Jenny invests $7,115 in a retirement account with a fixed annual interest rate of 2.73% compounded 4 times per year. What will the account balance be after 20 years?

$7115\left(1+\frac{.0273}{4}\right)^{80}$

$12260.10

40) John invests $4,993 in a savings account with a fixed annual interest rate of 2% compounded 4 times per year. What will the account balance be after 11 years?

$4993\left(1+\frac{.02}{4}\right)^{44}$

$6218.25

Round your answer to the nearest whole year.

41) Alberto invests $3,898 in a retirement account with a fixed annual interest rate of 7.89% compounded 4 times per year. How long will it take for the account balance to reach $18,598.90?

$18598.60 = 3898\left(1+\frac{.0789}{4}\right)^{4t}$

$4.8 = (1.012)^{4t}$

$\frac{\log 4.8}{\log 1.012} = 4t$

$131.5 = 4t$

$t \approx 33$ yrs

$4.8 = (1.02)^{4t}$

$\frac{\log 4.8}{\log 1.02} = 4t$

$\frac{79.21 = 4t}{4}$

$t \approx 20$ yrs

42) Gabriella invests $1,213 in a savings account with a fixed annual interest rate of 4% compounded 12 times per year. How long will it take for the account balance to reach $1,882.06?

$1882.06 = 1213\left(1+\frac{.04}{12}\right)^{12t}$

$1.55 = (1.003)^{12t}$

$\frac{\log 1.55}{\log 1003} = 12t$

$146.3 = 12t$

$t \approx 12$ yrs