College Math Name KEY

Logarithmic & Exponential Functions - Unit Review

Date_____

Use a calculator to approximate each to the nearest thousandth.

1) $\log 2$

0.301

2) $\log_3 33$

$\frac{\log 33}{\log 3} = 3.183$

3) $\ln 2.3$

0.833

Rewrite each equation in exponential form.

4) $\log_y x = -2$

$y^{-2} = x$

5) $\log_1 \frac{135}{178} = x$

$1^x = \frac{135}{178}$

6) $\log b = 11$

$10^{11} = b$

7) $\ln m = 13$

$e^{13} = m$

Rewrite each equation in logarithmic form.

8) $x^y = \frac{2}{25}$

$\log_x \frac{2}{25} = y$

9) $e^m = 24$

$\ln 24 = m$

10) $10^x = y$

$\log y = x$

11) $m^{-14} = n$

$\log_m n = -14$

Expand each logarithm. (3 points each)

12) $\log_2 \frac{a^3}{b^6}$

$\log_2 a^3 - \log_2 b^6$

$3\log_2 a - 6\log_2 b$

13) $\log_9 (z^2\sqrt{x})$

$\log_9 z^2 + \log_9 x^{1/2}$

$2\log_9 z + \frac{1}{2}\log_9 x$

14) $\log\left(x^6 y^5\right)$

$\log x^6 + \log y^5$

$6\log x + 5\log y$

15) $\log_7\left(\frac{x}{y^6}\right)^2$

$2\log_7 x - 2\log_7 y^6$

$2\log_7 x - 12\log_7 y$

Condense each expression to a single logarithm. (3 points each)

16) $4\ln a + 24\ln b$

$\ln a^4 + \ln b^{24}$

$\ln\left(a^4 b^{24}\right)$

17) $\log_9 u + 4\log_9 v + 6\log_9 w$

$\log_9 u + \log_9 v^4 + \log_9 w^6$

$\log_9\left(u v^4 w^6\right)$

18) $5\log_7 u - 8\log_7 v$

$\log_7 u^5 - \log_7 v^8$

$\log_7\left(\frac{u^5}{v^8}\right)$

19) $5\log_2 z + \frac{\log_2 x}{3}$

$\log_2 z^5 + \frac{1}{3}\log_2 x$

$\log_2 z^5 + \log_2 x^{1/3}$

$\log_2\left(z^5 \sqrt[3]{x}\right)$

Solve each equation. (4 points each)

20) $8^x = 90$

$\log_8 90 = x$

$2.164 = x$

21) $6 \cdot 14^x = 17$

$14^x = 2.8\overline{3}$

$\log_{14} 2.8\overline{3} = x$

$0.395 = x$

22) $-3 \cdot 15^{-5m} = -36$

$15^{-5m} = 12$

$\log_{15} 12 = -5m$

$.918 = -5m$

$-.184 = m$

23) $5^{5.2r+3} - 1.2 = 95$

$5^{5.2r+3} = 96.2$

$\log_5 96.2 = 5.2r + 3$

$2.837 = 5.2r + 3$

$-0.163 = 5.2r$

$-.031 = r$

24) $\log_5 v = 1$

$5^1 = v$

$5 = v$

25) $\log_{12} a - 6 = -2$

$\log_{12} a = 4$

$12^4 = a$

$20{,}736 = a$

26) $-7\log_{11} r + 10 = -4$

$-7\log_{11} r = -14$

$\log_{11} r = 2$

$11^2 = r$

$121 = r$

27) $-8\log_{11}(k-2) = 0$

$\log_{11}(k-2) = 0$

$11^0 = k-2$

$1 = k-2$

$3 = k$

28) $\log_2 x + \log_2 6 = 4$

$\log_2(6x) = 4$

$2^4 = 6x$

$16 = 6x$

$2.\overline{6} = x$

29) $\log_9 x - \log_9 2 = 1$

$\log_9\left(\frac{x}{2}\right) = 1$

$9^1 = \frac{x}{2}$

$18 = x$

30) $\log_6 -3x - \log_6 5 = 1$

$\log_6\left(\frac{-3x}{5}\right) = 1$

$6^1 = \frac{-3x}{5}$

$30 = -3x$

$-10 = x$

31) $\log_4(x-8) - \log_4 8 = 2$

$\log_4\left(\frac{x-8}{8}\right) = 2$

$4^2 = \frac{x-8}{8}$

$16 = \frac{x-8}{8}$

$128 = x-8$

$136 = x$

32) $\log_2(x-5) + \log_2 9 = 2$

$\log_2(9(x-5)) = 2$

$\log_2(9x-45) = 2$

$2^2 = 9x-45$

$4 = 9x-45$

$5.\overline{4} = x$

33) $\log_7(x+3) + \log_7 3 = 1$

$\log_7(3(x+3)) = 1$

$\log_7(3x+9) = 1$

$7^1 = 3x+9$

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

34) $\log x - \log 5 = \log 25$

$\log\left(\frac{x}{5}\right) = \log 25$

$\frac{x}{5} = 25$

$x = 125$

35) $\log_7 8 + \log_7 4x = \log_7 13$

$\log_7(8 \cdot 4x) = \log_7 13$

$\log_7(32x) = \log_7 13$

$32x = 13$

$x = .40625$