Algebra 2
Unit 7A Logarithm Test Review

Name KEY

Date: _____ Per: _____

Change each of the following from exponential to logarithmic form or vice versa.

1. $\log_4\left(\frac{1}{16}\right) = -2$

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

2. $8^2 = 64$

$\log_8 64 = 2$

3. $\log 100 = 2$

$10^2 = 100$

4. $4^{-1} = \left(\frac{1}{4}\right)$

$\log_4 1/4 = -1$

5. $\log_2 32 = 5$

$2^5 = 32$

6. $3^4 = 81$

$\log_3 81 = 4$

Solve each of the following equations. Round all solutions to 4 decimal places. Don't forget to check for extraneous solutions when necessary!!!

7. $9^{3x-7} = 9^{5x+3}$

$3x - 7 = 5x + 3$

$-7 = 2x + 3$

$-10 = 2x$

$-5 = x$

8. $2^{9x} = 16^{3x-8}$

$2^{9x} = 2^{4(3x-8)}$

$9x = 4(3x-8)$

$9x = 12x - 32$

$-3x = -32$

$x = 32/3 = 10.67$

9. $2^{3x-1} = 100$

$\log_2 100 = 3x - 1$

$(\log_2 100) + 1 = 3x$

$x = \frac{(\log_2 100) + 1}{3}$

$x = 2.5480$

10. $\log_4(2x) = 5$

$4^5 = 2x$

$1024 = 2x$

$x = 512$

11. $7^{2x} = 49^{3x+4}$

$7^{2x} = 7^{2(3x+4)}$

$2x = 2(3x+4)$

$2x = 6x + 8$

$-4x = 8$

$x = -2$

12. $\ln(x+2) = 12$

$e^{12} = x + 2$

$x = e^{12} - 2$

$x = 162752.7914$

13. $e^{x+3} - 5 = 9$

$e^{x+3} = 14$

$\ln 14 = x + 3$

$x = (\ln 14) - 3$

$x = -0.3609$

14. $2\log 7 + \log x = 2$

$\log 7^2 + \log x = 2$

$\log 49 + \log x = 2$

$\log 49x = 2$

$10^2 = 49x$

$100 = 49x$

$x = \frac{100}{49} = 2.0408$

15. $\log_3(x^2 - 21) = \log_3(-4x)$

$x^2 - 21 = -4x$

$x^2 + 4x - 21 = 0$

$(x+7)(x-3) = 0$

$x = -7 \quad x = 3$

EXTRANEOUS

16. $\log_3(6x-2) - \log_3 5 = 4$

$\log_3\left(\frac{6x-2}{5}\right) = 4$

$3^4 = \frac{6x-2}{5}$

$81 = \frac{6x-2}{5}$

$405 = 6x - 2$

$407 = 6x$

$x = \frac{407}{6} = 67.8333$

17. $\log_2 \sqrt{x-2} = 3$

$2^3 = \sqrt{x-2}$

$(8)^2 = (\sqrt{x-2})^2$

$64 = x - 2$

$66 = x$

18. $e^{2x+4} = 7$

$\ln 7 = 2x + 4$

$(\ln 7) - 4 = 2x$

$x = \frac{(\ln 7) - 4}{2}$

$x = -1.0270$

Find the inverse for the following functions.

19. $f(x) = 2(x-3)^3 + 5$

$y = 2(x-3)^3 + 5$

$x = 2(y-3)^3 + 5$

$x - 5 = 2(y-3)^3$

$\frac{x-5}{2} = (y-3)^3$

$\sqrt[3]{\frac{x-5}{2}} = y - 3$

$y = \sqrt[3]{\frac{x-5}{2}} + 3$

$f^{-1}(x) = \sqrt[3]{\frac{x-5}{2}} + 3$

20. $f(x) = (x+2)^5 - 8$.

$y = (x+2)^5 - 8$

$x = (y+2)^5 - 8$

$\sqrt[5]{x+8} = \sqrt[5]{(y+2)^5}$

$\sqrt[5]{x+8} = y + 2$

$y = \sqrt[5]{x+8} - 2$

$f^{-1}(x) = \sqrt[5]{x+8} - 2$

21. $f(x) = 7(x-1)^3 - 2$.

$y = 7(x-1)^3 - 2$

$x = 7(y-1)^3 - 2$

$x + 2 = 7(y-1)^3$

$\frac{x+2}{7} = (y-1)^3$

$\sqrt[3]{\frac{x+2}{7}} = y - 1$

$y = \sqrt[3]{\frac{x+2}{7}} + 1$

$f^{-1}(x) = \sqrt[3]{\frac{x+2}{7}} + 1$

22. $f(x) = 2\sqrt{x-5} + 4$.

$y = 2\sqrt{x-5} + 4$

$x = 2\sqrt{y-5} + 4$

$x - 4 = 2\sqrt{y-5}$

$\left(\frac{x-4}{2}\right)^2 = \left(\sqrt{y-5}\right)^2$

$\left(\frac{x-4}{2}\right)^2 = y - 5$

$y = \left(\frac{x-4}{2}\right)^2 + 5$

$f^{-1}(x) = \left(\frac{x-4}{2}\right)^2 + 5$

23. Error Analysis. A math test contained the equation: $27 = 3^{5x-3}$

A student used the equation $3^4 = 3^{5x-3}$ to find his answer.

What error did he make? $3^4 = 81$ NOT 27; SHOULD HAVE REWROTE IT AS $3^3 = 27$

Find the correct answer. Show your work.

$3^3 = 3^{5x-3}$

$3 = 5x - 3$

$6 = 5x$

$x = 6/5 = 1.2$