Name Key Per ____

Chapter 7 Self-Assessment
Logarithmic Functions
Algebra 2

Rewrite the equations into logarithmic form.

1. $2^5 = 32$
2. $\left(\frac{1}{3}\right)^{-3} = 27$

Rewrite the equations into exponential form.

3. $\log_5 25 = 2$
4. $\ln e = 1$

Evaluate the following logarithms.

5. $\log_2 16$
6. $\log_4 4^6$
7. $\log \frac{1}{100}$
8. $\ln e^5$
9. $9^{\log_9 2}$
10. $\ln 1$

Expand the following logarithm.

11. $\ln \frac{5x^2}{2}$

Condense the following logarithm.

12. $2\log x + \log y - \log z$

For #13-19, solve the equations for x. Check for extraneous solution. Round to 3 decimal places if needed.

13. $2^{x+3} = \frac{1}{16}$

$2^{x+3} = 2^{-4}$

$x+3 = -4$

14. $\left(\frac{1}{3}\right)^x = 3^{x-6}$

$(3^{-1})^x = 3^{x-6}$

$-x = x-6$

$-2x = -6$

$x = 3$

1. $\log_2 32 = 5$
2. $\log_{\frac{1}{3}} 27 = -3$
3. $5^2 = 25$
4. $e^1 = e$
5. 4
6. 6
7. -2
8. 5
9. 2
10. 0
11. $\ln 5 + 2\ln x - \ln 2$
12. $\log \frac{x^2 y}{z}$
13. $x = -7$
14. $x = 3$

$X = \frac{1}{36^{1/2}}$

$3x = \ln 3$

$X = \frac{\ln 3}{3}$

15. $\log_x 36 = -2$

$(X^{-2})^{-1/2} = (36)^{-1/2}$

16. $-2 + 3e^{3x} = 7$

$3e^{3x} = 9$

$e^{3x} = 3$

$\ln e^{3x} = \ln 3$

17. $3^{x+2} = 14.5$

$\ln 3^{x+2} = \ln 14.5$

$(x+2)\ln 3 = \ln 14.5$

$x+2 = \frac{\ln 14.5}{\ln 3}$

18. $\log_8(x^2 + x) = \log_8 12$

$x^2 + x = 12$

$x^2 + x - 12 = 0$

$(x+4)(x-3) = 0$

19. $\ln(3x) + \ln(2x) = 9$

$\ln(6x^2) = 9$

$e^9 = 6x^2$ $\quad x^2 = \frac{e^9}{6}$ $\quad x = \pm\sqrt{\frac{e^9}{6}}$

20. Find the exponential function of the form, $y = a \cdot b^x$, whose graph passes through the points (0,2) and grows 30% per year.

$y = 2(1.3)^x$

21. You deposit $1000 in an account that pays 7.3% annual interest compounded monthly. How much money would you have after 15 years?

$A = 1000\left(1 + \frac{.073}{12}\right)^{12 \cdot 15}$

22. The value of a new car purchases for $28,000 decreases by 12% per year.

a. Write an exponential model for the value of the car.

b. Use the model to estimate the value after 5 years.

23. You deposit $5000 in an account that pays 3% annual interest compounded continuously. How long (to the nearest year) would it take to double your money?

$5000e^{(.03t)} = 10{,}000$

$\ln e^{(.03t)} = \ln 2$

$.03t = \ln 2$

Useful formulas

$A = P\left(1 + \frac{r}{n}\right)^{nt}$ $\quad A = Pe^{rt}$ $\quad y = a(1+r)^t$ $\quad y = a(1-r)^t$

15. $x = \frac{1}{6}$

16. 0.366

17. 0.434

18. $x = -4, 3$

19. $x = 36.7493$

20. $y = 2(1.3)^x$

21. $2,979.28

22a. $A = 28{,}000(1-.12)$

$A = 28{,}000(.88)^x$

22b. $14,776.49

23. 23 years