Name _____ Date _____ Period _____

DIRECTIONS: For #1-2, rewrite the logarithmic expressions in **exponential form**. Write your answers in the provided blanks.

1. $\log_9 729 = 3$

$\mathbf{9^3 = 729}$

2. $\ln 24 = 3.18$

$\mathbf{e^{3.18} = 24}$

DIRECTIONS: For #3-4, rewrite the exponential expressions in **logarithmic form**. Write your answers in the provided blanks.

3. $e^7 = 1096.63$

$\mathbf{\ln 1096.63 = 7}$

4. $2^6 = 64$

$\mathbf{\log_2 64 = 6}$

DIRECTIONS: For #5-9, **simplify** the expressions. Write your answers in the provided blanks.

5. $\log_6 36$

$\mathbf{2}$

6. $\log_{27} \frac{1}{3}$

$\mathbf{-\frac{1}{3}}$

7. $2 \log 5 + \log 4$

$\mathbf{2}$

8. $\log_3 4 - \log_3 36$

$\mathbf{-2}$

9. $\ln e^8$

$\mathbf{8}$

DIRECTIONS: For #10, **expand** the logarithmic expression. Write your answers in the provided blanks.

10. $\log_6 \frac{10x}{y^3}$ $\log_6 10 + \log_6 x - 3\log_6 y$

DIRECTIONS: For #11-12, **condense** the logarithmic expressions **into one term**. Write your answers in the provided blanks.

11. $\ln 80 - \ln 20$ $\ln 4$

12. $3\log_4 x + \log_4 6$ $\log_4 6x^3$

DIRECTIONS: For #13-17, **solve** the equations for the variable *x*. Write your answers in the provided blanks.

13. $\log_2 x = 8$ 256

14. $\log_x 16 = \frac{4}{3}$ 8

15. $\log_x 4 = 1$ 4

16. $\log_a x = 3\ \log_a 2 + \log_a 6$

$\boldsymbol{x = 48}$

17. $\log_b(x+2) - \log_b x = \log_b 6$

$\boldsymbol{x = \frac{2}{5}}$

DIRECTIONS: For #18-20, use the **change of base** formula (and a calculator) to evaluate the expressions to the nearest thousandth (3 decimal places). Write your answers in the provided blanks.

18. $\log_3 15$ **19.** $\log_5 2$ **20.** $\log_{\frac{1}{3}} 27$

$\boldsymbol{2.465}$ $\boldsymbol{0.431}$ $\boldsymbol{-3}$

DIRECTIONS: For #21-24, **solve for x**. Give answers to the nearest thousandth (3 decimal places)

21. $12^x = 360$ **22.** $4\log_3 x + 3 = 5$

$\boldsymbol{2.369}$ $\boldsymbol{1.732}$

23. $\log x = 2.3491$ **24.** $\log x = 31.9004$

$\boldsymbol{223.409}$ $\boldsymbol{7.951\ x\ 10^{31}}$

The following formulas may help you answer #25-28.

$$A = p(1+r)^t \qquad A = p(1-r)^t \qquad A = p(1+\frac{r}{n})^{nt}$$

DIRECTIONS: For #25-28, use the given information to **answer the questions**. Show work and round answers to the nearest hundredth (or nearest cent). Write your answers in the provided blanks.

25. A house appreciates at a rate of 2.4% per year. How much will the house be worth in 15 years if it was purchased for $81,000?

$115,607.06

26. A car that was purchased for $24,000 depreciated to a value of $8,000 after 6 years. What was the annual rate of depreciation?

16.73%

$A = p(1 + r)^t$ $A = p(1 - r)^t$ $A = p(1 + \frac{r}{n})^{nt}$

27. If you invest $5,000 in a fund that earns 8% interest compounded quarterly, how much will you have after 10 years?

$11,040.20

28. How long (in years) will it take for an amount deposited at 3.9% interest compounded monthly to double in value?

17.80 years