Name _____ Class _____ Date _____

Practice 7-6

Mixed Exercises

The formula $P = 50e^{-\frac{t}{25}}$ gives the power output, P, in watts, of a satellite in t days. Find how long a satellite with the given power output will operate.

1. 10 watts **2.** 12 watts **3.** 14 watts

The formula for the maximum velocity v of a rocket is $v = c \ln R$, where c is the velocity of the exhaust and R is the mass ratio of the rocket. A rocket must reach 7.8 km/s to attain a stable orbit.

4. Find the maximum velocity of a rocket with a mass ratio of about 18 and an exhaust velocity of 2.2 km/s. Can this rocket achieve a stable orbit?

5. What mass ratio would be needed to achieve a stable orbit for a rocket with an exhaust velocity of 2.5 km/s?

6. A rocket with an exhaust velocity of 2.4 km/s can reach a maximum velocity of 7.8 km/s. What is the mass ratio of the rocket?

Evaluate each expression without a calculator.

7. $\ln e^3$ **8.** $e^{\ln 2}$ **9.** $e^{\ln 6}$ **10.** $\ln e^8$ **11.** $5\ln e^7$

Solve each equation. Use properties of logarithms to simplify each as needed.

12. $\ln x = 27$ **13.** $3\ln 2x = 6$ **14.** $\ln x + \ln 2x = 6$

15. $\ln x - \ln 4 = 1$ **16.** $e^x = 3$ **17.** $e^{3x} = 0.002$

18. $e^{2x} - 6 = 5$ **19.** $e^{3x+5} = 123$ **20.** $5e^{6x} = 12$

21. $4 - e^x = 2$ **22.** $e^{\frac{3x}{4}} = 4$ **23.** $7e^{4x} - 2 = -1$

24. $\ln x + \ln (x + 1) = 2$ **25.** $\ln (3x - 2) = -3$ **26.** $\ln (5x - 1) - \ln x = -2$

27. $\ln x - \ln 3 = 9$ **28.** $2\ln x - \ln 6 = 10$ **29.** $\ln x + \ln 2x = 1$

30. $7e^{4x} = 3$ **31.** $e^{3x-1} = 0$ **32.** $e^{2(3x+1)} = 42$

33. $e^{\ln x} = 31$ **34.** $5e^{\ln 3x} = 12$ **35.** $6\ln e^x = 21$

36. $\ln\left(\frac{2x}{3} + 5\right) = 8$ **37.** $\ln 5x = 5$ **38.** $\ln (2x + 3) + \ln x = 9$

39. $\ln (2x + 3) - \ln x = 9$ **40.** $e^{4x-3} = 0.012$ **41.** $\ln e^{2x} = 44$

42. $e^{\ln 2x} = 44$ **43.** $e^{\ln x} + \ln e^{3x} = e^{\ln 8}$ **44.** $2\ln e^x + \ln e^{3x} = 4$