

Name Key Date _____ Period _____

Algebra II - Worksheet 7.4 A
Properties of Logs

Write each equation in exponential form.

1. $\log_2 64 = 6$ $2^6 = 64$ 2. $\log_4 \frac{1}{64} = -3$ $4^{-3} = \frac{1}{64}$ 3. $\log_{10}(0.01) = -2$ $10^{-2} = .01$

Write each equation in logarithmic form.

4. $2^5 = 32$ $\log_2 32 = 5$ 5. $5^{1/2} = \frac{\sqrt{5}}{5}$ $\log_5 \frac{\sqrt{5}}{5} = \frac{1}{2}$ 6. $10^{-1} = 0.1$ $\log_{10} 0.1 = -1$

Evaluate the expression. Hint—set = x and solve for x.

7. $\log_2 8$ 3
8. $\log_8 64$ 2
9. $\log_6 216$ 3
10. $\log_7 7$ 1
11. $\log_5 1$ 0
12. $\log_8 \frac{1}{8}$ -1
13. $\log_7 \frac{1}{49}$ -2
14. $\log_9 \frac{1}{27}$ $-\frac{3}{2}$
15. $\log_5 \sqrt{5}$ $\frac{1}{2}$
16. $\log_9 3$ $\frac{1}{2}$
17. $\log_2 16$ 4
18. $\log_{1/2} 16$ -4

Solve for x.
19. $\log_5 x = 2$ 36
20. $\log_5 x = 3$ 125
21. $\log_{16} x = -1$ $\frac{1}{16}$
22. $\log_3 x = 2$ 81

23. $\log_{1/4} x = -2$ 16
24. $\log_x 64 = 3$ 4
25. $\log_x 8 = -1$ $\frac{1}{8}$

Expand the expression using the properties of logs. The word log will be used repeatedly in each problem.

26. $\log_6 3x$ $\log_6 3 + \log_6 x$
27. $\log_2 \frac{x}{5}$ $\log_2 x - \log_2 5$
28. $\log_{10} xy^2$ $\log_{10} x + 2\log_{10} y$
29. $\log_4 \frac{xy}{3}$ $\log_4 x + \log_4 y - \log_4 3$
30. $\log_3 x^2 yz$ $2\log_3 x + \log_3 y + \log_3 z$
31. $\log_5 2x$ $\log_5 2 + \log_5 x$

Condense the expression using the properties of logs. The word log will be used once in each problem.

32. $\log_3 7 - \log_3 x$ $\log_3 \frac{7}{x}$
33. $2 \log_5 x + \log_5 3$ $\log_5 3x^2$
34. $\log_4 5 + \log_4 x + \log_4 y$ $\log_4 5xy$
35. $3 \log_{10} x - \log_{10} 4$ $\log_{10} \frac{x^3}{4}$
36. $2 \log_2 x - 3 \log_2 y$ $\log_2 \frac{x^2}{y^3}$
37. $\log_3 4 + 2 \log_3 x - \log_3 5$ $\log_3 \frac{4x^2}{5}$
38. $\log_2 x - 2 \log_2 y$ $\log_2 \frac{x}{y^2}$
39. $3 \log_a 2 + \log_a 6 - 2 \log_a 4$ $\log_a \frac{2^3 \cdot 6}{4^2} = \log_a 3$

Condense the left side of the equation, then solve for x.

40. $2 \log_4 3 = \log_4 x$ $\log_4 3^2 = \log_4 x$ 9
41. $\log_{10} x + \log_{10} 3 = \log_{10} 12$ $\log_{10} 3x = \log_{10} 12$ 4
42. $\log_3 5 - \log_3 x = \log_3 2$ $\log_3 \frac{5}{x} = 2$ 2.5

43. $2 \log_3 2 = \log_3 x$ $\log_3 4 = \log_3 x$ 4
44. $3 \log_{10} x = \log_{10} 27$ $\log_{10} x^3 = \log_{10} 27$ 3
45. $3 \log_5 2 + \log_5 x = \log_5 24$ $\log_5 2^3 \cdot x = \log_5 24$ 3

$$y = a(.5)^{n \text{ time/half life}}$$

$$y = a \cdot b^x$$

$$b = 1 + R \text{ G}$$

$$b = 1 - R \text{ D}$$

$$y = 72(.5)^{88/92}$$

37 mg

Name: _____

SHORT ANSWERS

Unit 3 Review

Time, t (years)	2	4	6	8	10	12	14
Value of Fund	7700	9800	12,500	16,000	20,300	26,000	33,300

1.) $y = 6021.1(1.1)^x$

2.) $1.1 = b$ $r = 10\%$

3.) \$69,014

4.) between 17 and 18 yrs

5.) $y = 1500(1.012)^x$

6.) 1794 ppl

7.) $2000 = 1500(1.012)^x$

12.) $\log_{10} 3x + 6 = 2$

$$10^2 = 3x + 6$$

$$x = 31.33$$

13.) $(x-3)\log 5 = \log 12$

$$x = 4.544$$

- Write an exponential function to model the data
- According to the model, what is the growth rate
- What will be the value of the fund after 20 years
- After how many years will the fund have \$50,000

In 2000 the population of Holly Springs was 1500 and it is growing at 1.2% each year.

- Write an exponential model for this data $y = 1500(1.012)^x$
- Estimate the population in Holly Springs in 2015
- Estimate when will the population of Holly Springs reach 2000

Josh has 2000 to invest. How much will he have after 5 years if it is invested in an account paying 4.25% interest compounded:

- Semi-annually
- Monthly
- Continuously

11. The half-life of Iodine-131 is 92 days. If Dr. Walls has a 72 mg sample, how much will she have after 88 days?

12. Solve: $\log(x+2) + \log 3 = 2$

13. Solve: $5^{x-3} = 12$

8.) $A = 2000(1 + \frac{.0425}{2})^{2 \cdot 5}$
\$2468

9.) $2000(1 + \frac{.0425}{12})^{12 \cdot 5}$
\$2473

24 yrs = 2024

10.) $A = 2000e^{(.0425)(5)}$
\$2474

compound / cont.
half life / growth / decay