

Exam

Name _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Write the equation in its equivalent exponential form.

1) $\log_8 64 = x$ 1) _____

2) $\log_b 64 = 3$ 2) _____

Write the equation in its equivalent logarithmic form.

3) $3^{-2} = \frac{1}{9}$ 3) _____

4) $a^4 = 4096$ 4) _____

Evaluate the expression without using a calculator.

5) $\log_2 8$ 5) _____

6) $\log_6 \frac{1}{6}$ 6) _____

7) $\log_4 \frac{1}{\sqrt{4}}$ 7) _____

8) $\log_3 3^{11}$ 8) _____

Find the domain of the logarithmic function.

9) $f(x) = \log_5 (x - 1)$ 9) _____

10) $f(x) = \log (x^2 - 7x + 10)$ 10) _____

Evaluate or simplify the expression without using a calculator.

11) $\log \left(\frac{1}{100} \right)$ 11) _____

12) $10 \log 4$ 12) _____

13) $10 \log \sqrt[7]{x}$

13) _____

14) $\ln \sqrt[8]{e}$

14) _____

Evaluate the expression without using a calculator.

15) $\ln e^{17x}$

15) _____

16) $e^{\ln 17x^3}$

16) _____

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

17) $\log(100x)$

17) _____

18) $\log_5(125x)$

18) _____

19) $\ln\left(\frac{e^2}{11}\right)$

19) _____

20) $\log_4\left(\frac{16}{x}\right)$

20) _____

21) $\log N^{-5}$

21) _____

22) $\log_4 \sqrt[8]{y}$

22) _____

23) $\log_4\left(\frac{16}{\sqrt{x-1}}\right)$

23) _____

24) $\log_b\left(\frac{xy^2}{z^5}\right)$

24) _____

25) $\log\left[\frac{2x^3\sqrt[3]{4-x}}{5(x+4)^2}\right]$

25) _____

Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

26) $(\log_a x - \log_a y) + 2 \log_a z$ 26) _____

27) $\frac{1}{2}(\log_3 (r - 8) - \log_3 r)$ 27) _____

28) $\frac{1}{7}[3 \ln (x + 1) - \ln x - \ln (x^2 - 8)]$ 28) _____

Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

29) $\log_{0.6} 16$ 29) _____

30) $\log_{\pi} 22$ 30) _____

Solve the equation by expressing each side as a power of the same base and then equating exponents.

31) $4(x - 8)^{1/2} = \sqrt{4}$ 31) _____

32) $9^x + 9 = 27^x - 3$ 32) _____

33) $25^x = \frac{1}{\sqrt{5}}$ 33) _____

Solve the exponential equation. Express the solution set in terms of natural logarithms.

34) $4^x + 4 = 5^{2x + 5}$ 34) _____

35) $2^{x + 8} = 6$ 35) _____

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

36) $46^x = 3.3$ 36) _____

37) $e^{5x - 7} - 3 = 1145$ 37) _____

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

38) $\log_5 x + \log_5 (x - 24) = 2$ 38) _____

39) $\log_3 (x + 6) + \log_3 (x - 6) - \log_3 x = 2$ 39) _____

40) $\log_5 (x - 2) = 4 + \log_5 (x - 3)$ 40) _____

41) $\log_3 x^2 = \log_3 (5x + 36)$ 41) _____

42) $\ln (x - 6) + \ln (x + 1) = \ln (x - 15)$ 42) _____

43) $\ln (x - 2) - \ln (x + 4) = \ln (x - 5) - \ln (x + 2)$ 43) _____

Solve the problem.

44) Find out how long it takes a \$2800 investment to double if it is invested at 8% compounded quarterly. Round to the nearest tenth of a year. Use the formula $A = P \left(1 + \frac{r}{n} \right)^{nt}$. 44) _____

45) The formula $A = 239e^{0.04t}$ models the population of a particular city, in thousands, t years after 1998. When will the population of the city reach 402 thousand? 45) _____

46) Cindy will require \$10,000 in 2 years to return to college to get an MBA degree. How much money should she ask her parents for now so that, if she invests it at 12% compounded continuously, she will have enough for school? (Round your answer to the nearest dollar.) 46) _____

47) The size of the coyote population at a national park increases at the rate of 4.8% per year. If the size of the current population is 200, find how many coyotes there should be in 6 years. Use $y = y_0e^{0.048t}$ and round to the nearest whole number. 47) _____

Solve.

48) The function $A = A_0e^{-0.00866x}$ models the amount in pounds of a particular radioactive material stored in a concrete vault, where x is the number of years since the material was put into the vault. If 500 pounds of the material are initially put into the vault, how many pounds will be left after 170 years? 48) _____

49) The half-life of silicon-32 is 710 years. If 20 grams is present now, how much will be present in 300 years? (Round your answer to three decimal places.) 49) _____

50) A fossilized leaf contains 11% of its normal amount of carbon 14. How old is the fossil (to the nearest year)? Use 5600 years as the half-life of carbon 14. 50) _____

Answer Key

Testname: CH 3 PRACTICE TEST

- 1) $8^x = 64$
- 2) $b^3 = 64$
- 3) $\log_3 \frac{1}{9} = -2$
- 4) $\log_a 4096 = 4$
- 5) 3
- 6) -1
- 7) $-\frac{1}{2}$
- 8) 11
- 9) $(1, \infty)$
- 10) $(-\infty, 2) \cup (5, \infty)$
- 11) -2
- 12) 4
- 13) $x^{1/7}$
- 14) $\frac{1}{8}$
- 15) $17x$
- 16) $17x^3$
- 17) $2 + \log x$
- 18) $3 + \log_5 x$
- 19) $2 - \ln 11$
- 20) $2 - \log_4 x$
- 21) $-5 \log N$
- 22) $\frac{1}{8} \log_4 y$
- 23) $2 - \frac{1}{2} \log_4 (x - 1)$
- 24) $\log_b x + 2 \log_b y - 5 \log_b z$
- 25) $\log 2 + 3 \log x + \frac{1}{3} \log (4 - x) - \log 5 - 2 \log (x + 4)$
- 26) $\log_a \frac{xz^2}{y}$
- 27) $\log_3 \sqrt{\frac{r-8}{r}}$
- 28) $\ln \sqrt[7]{\frac{(x+1)^3}{x(x^2-8)}}$
- 29) -5.4277
- 30) 2.7002
- 31) {9}
- 32) {27}
- 33) $\left\{ -\frac{1}{4} \right\}$
- 34) $\left\{ \frac{5 \ln 5 - 4 \ln 4}{\ln 4 - 2 \ln 5} \right\}$

Answer Key

Testname: CH 3 PRACTICE TEST

35) $\left\{ \frac{\ln 6}{\ln 2} - 8 \right\}$

36) 0.14

37) 2.81

38) {25}

39) {12}

40) $\left\{ \frac{1873}{624} \right\}$

41) {9, -4}

42) \emptyset

43) $\{-16\}$

44) 8.8 years

45) 2011

46) \$7866

47) 267

48) 115 pounds

49) 14.922

50) 17,801