

Print Name _____

SHORT ANSWER. Answer the question, including units in your answer if needed. Show work and circle your final answer.

Solve the logarithmic equation.

1) $\log_8 x = 4$

1) _____

Solve.

2) In a town whose population is 3000, a disease creates an epidemic. The number N of people infected t days after the disease has begun is given by the function $N(t) = \frac{3000}{1 + 18.3e^{-0.6t}}$. Find the number infected after 12 days.

2) _____

Solve the logarithmic equation.

3) $\log_9 (x - 7) + \log_9 (x - 7) = 1$

3) _____

4) $\log_3(8x - 6) = 3$

4) _____

5) $\log_5(x + 4) + \log_5(x - 4) = 2$

5) _____

Solve.

6) In 1998, the population of Country C was 26 million, and the exponential growth rate was 1% per year. Find the exponential growth function.

6) _____

7) In 1985, the number of female athletes participating in Summer Olympic-Type Games was 450. In 1996, about 3650 participated in the Summer Olympics in Atlanta. Assuming that $P(0) = 500$ and that the exponential model applies, find the value of k rounded to the hundredths place, and write the function.

7) _____

8) There are currently 50 million cars in a certain country, increasing exponentially by 5.2% annually. How many years will it take for this country to have 78 million cars? Round to the nearest year. 8) _____

9) Susan purchased a painting in the year 2000 for \$3000. Assuming an exponential rate of inflation of 3.5% per year, how much will the painting be worth 4 years later? 9) _____

Solve the problem.

10) A bacterial culture has an initial population of 10,000. If its population declines to 5000 in 2 hours, when will its population be 2500? Assume that the population decreases according to the exponential model. 10) _____

11) A sample of 800 grams of radioactive substance decays according to the function $A(t) = 800e^{-0.036t}$, where t is the time in years. How much of the substance will be left in the sample after 30 years? Round to the nearest whole gram. 11) _____

Provide an appropriate response.

12) Without using a calculator, determine which of these numbers is larger: $\pi^{1.3}$ or $\pi^{2.4}$. 12) _____

13) Explain why $\log_2 13$ is between 3 and 4. 13) _____

14) Explain why $a^{\log_a 5} = 5$. 14) _____

15) Explain how the graph of $f(x) = \ln x$ could be used to graph the function $g(x) = e^x - 1$. 15) _____

16) Explain the error in the following: $\log_3 2 + \log_3 M = \log_3 (2 + M)$.

16) _____

17) Explain how the equation $\log x = 1$ could be solved using the graph of $f(x) = \log x$.

17) _____

18) Explain the error in the following: $\log_4 3y = \log_4 3 \cdot \log_4 y$.

18) _____

Answer Key

Testname: 131_GRPREVASS_55_56

- 1) 4096
Objective: (5.5) Solve Logarithmic Equation I
- 2) 2960
Objective: (5.6) Solve Apps: Models of Limited Growth
- 3) 10
Objective: (5.5) Solve Logarithmic Equation II
- 4) $\frac{33}{8}$
Objective: (5.5) Solve Logarithmic Equation II
- 5) $\sqrt{41}$
Objective: (5.5) Solve Logarithmic Equation II
- 6) $P(t) = 26e^{0.01t}$, where $P(t)$ is in millions and t is the number of years after 1998.
Objective: (5.6) Solve Apps: Write Exponential Function
- 7) $k = 0.19$; $P(t) = 500e^{0.19t}$
Objective: (5.6) Solve Apps: Write Exponential Function
- 8) 9 yr
Objective: (5.6) Solve Apps: Exponential Growth
- 9) \$3450.82
Objective: (5.6) Solve Apps: Exponential Growth
- 10) after 4 hr
Objective: (5.6) Solve Apps: Exponential Decay
- 11) 272 g
Objective: (5.6) Solve Apps: Exponential Decay
- 12) Since the bases are the same, the base with the larger exponent is the larger number. Thus, $\pi^{2.4}$ is larger.
Objective: (5.6) *Know Concepts: Exponential and Logarithmic Functions I
- 13) $\log_2 8 = 3$ and $\log_2 16 = 4$. Since $8 < 13 < 16$, then $3 < \log_2 13 < 4$. This is true because $\log_2 x$ is an increasing function.
Objective: (5.6) *Know Concepts: Exponential and Logarithmic Functions I
- 14) Let $\log_a 5 = x$. Then $a^x = 5$. Replacing x with $\log_a 5$, we have $a^{\log_a 5} = 5$.
Objective: (5.6) *Know Concepts: Exponential and Logarithmic Functions I
- 15) Reflect the graph of $f(x) = \ln x$ across the line $y = x$ and then translate it to the right one unit.
Objective: (5.6) *Know Concepts: Exponential and Logarithmic Functions II
- 16) A sum of logarithms is not equal to a logarithm of a sum. $\log_3 2 + \log_3 M = \log_3 2M$
Objective: (5.6) *Know Concepts: Exponential and Logarithmic Functions II
- 17) Graph $f(x) = \log x$ and $g(x) = 1$ on the same set of axes. The solution is the first coordinate of the point of intersection of the two graphs.
Objective: (5.6) *Know Concepts: Exponential and Logarithmic Functions II
- 18) A logarithm of a product is not equal to a product of logarithms. $\log_4 3y = \log_4 3 + \log_4 y$
Objective: (5.6) *Know Concepts: Exponential and Logarithmic Functions II