Name_____ Class_____ Date_____

1 A sum of $4000 is invested in an account that pays 7% interest compounded annually. How much is in the account after 10 years?

2 Solve the equation.

$$116453 = 48700(1 + r)^{15}$$

3 A population of 25 fruit flies triples every month. How many fruit flies will there be after 6 months?

4 A typical beehive contains 18000 insects. The population can increase in size by a factor of 2.2 every 7 weeks. How many bees could there be after 9 weeks? Round the answer to the nearest whole number.

5 Solve the equation.

$$1512 = 7a^3$$

a. $a = 0.002$ b. $a = 72.000$ c. $a = 6.000$ d. $a = 2.333$ e. $a = 0.005$

6 Compare the graphs of

$$f(x) = 3^x \text{ and } g(x) = 4^x$$

and choose the correct statement below.

A. For positive *x*-values, $g(x)$ is always smaller than $f(x)$, and is increasing more rapidly. Both graphs cross the *y*-axis at (0, 1).

B. For negative *x*-values, $g(x)$ is always larger than $f(x)$, and is increasing more rapidly.

C. For positive *x*-values, $g(x)$ is always larger than $f(x)$, and is increasing more rapidly.

D. For positive *x*-values, $g(x)$ is the same compared with $f(x)$.

7 Solve the equation.

$$64 \cdot 4^{(-2x)} = 16^{(x+10)}$$

8 Complete the table of values comparing the values of the two functions.

$f(x) = 4^{x-1}$, $g(x) = 4^x - 2$

x	$y = 4^x$	$f(x)$	$g(x)$
-2			
-1			
0			
1			

2			

9 Before the advent of antibiotics an outbreak of cholera might spread through a city so that the number of cases doubled every 3 days. Twenty-two cases were discovered on July 5. Write a function for the number of cases of cholera t days later.

a. $f(t) = 22 \cdot (3)^{\frac{t}{3}}$

b. $f(t) = 22 \cdot (2)^{\frac{t-3}{2}}$

c. $f(t) = 22 \cdot (3)^{t}$

d. $f(t) = 22 \cdot (2)^{\frac{t}{3}}$

e. $f(t) = 3 \cdot (2)^{\frac{t}{22}}$

10 Evaluate.

$$\log_5 \frac{1}{25}$$

11 Solve the equation.

$$58 = 92 - 25 \cdot 10^{0.2x}$$

Round the solution to four decimal places.

12 Rewrite the equation in logarithmic form.

$t^{5/2} = 19$

a. $\log_{19} t = \frac{5}{2}$

b. $\log_t 19 = 10$

c. $\log_t \frac{5}{2} = 19$

d. $\log_t 19 = \frac{5}{2}$

e. $\log_t 19 = \frac{2}{5}$

13 The atmospheric pressure decreases with altitude above the surface of the earth. Use the relationship

$P(a) = 30\,(10)^{-0.09a}$

between altitude a in miles and atmospheric pressure P in inches of mercury.

The elevation of the mountain is 20830 feet. What is the atmospheric pressure at the top? (*Hint*: 1 mile = 5280 feet). Round the answer to the nearest hundredth.

a. 13.74 in. b. 13.25 in. c. 11.89 in. d. 13.86 in. e. 67.95 in.

14 Decide whether the two expressions are equal or not.

$$\log_2\left(4^2\right), \left(\log_2 4\right)^2$$

15 Write the expression in terms of simpler logarithms. Assume that all variables denote positive numbers.

$$\log \frac{x y^{2}}{z^{1/3}}$$

Use the following properties of logarithms:

If $x, y > 0$ then

1. $\log_b (x y) = \log_b x + \log_b y$
2. $\log_b \frac{x}{y} = \log_b x - \log_b y$
3. $\log_b x^{m} = m \log_b x$

a. $\frac{\log x + \log y}{\log z}$

b. $\log x + 2\log y - \frac{1}{3}\log z$

c. $\log x - 3\log y + \frac{1}{2}\log z$

d. $\log x - 2\log y - \frac{1}{3}\log z$

e. $\frac{2\log x \cdot \log y}{\frac{1}{3}\log z}$

16 Given that $\log_b 2 = 0.7735$, $\log_b 3 = 1.226$, $\log_b 5 = 1.7961$, find the value of the expression.

$$\log_b \sqrt{3}$$

Round your answer to four decimal places.

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17 The annual rate of growth of population of a settlement is 7.9%. How long will it take for the population to quadruple? Round your answer to the nearest integer.

a. 139 years b. 24 years c. 15 years d. 1095 years e. 18 years

18 How long (in years) will it take a sum of money to increase eightfold if it is invested at 8% compounded monthly?

Use the following formula for compound interest. If P dollars is invested at an annual interest rate, r (expressed as a decimal), compounded n times yearly, the amount, A, after t years is given by

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

_____ years

ANSWER KEY

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1. 7868.61 **2.** r=0.06 **3.** 18225

x	$y = 4^x$	$f(x)$	$g(x)$
-2	$\frac{1}{16}$	$\frac{1}{64}$	$-\frac{31}{16}$
-1	$\frac{1}{4}$	$\frac{1}{16}$	$-\frac{7}{4}$
0	1	$\frac{1}{4}$	-1
1	4	1	2
2	16	4	14

4. 49606 **5.** c

6. C **7.** $-\frac{17}{4}$ **8.**

9. d **10.** -2

11. 0.6677 **12.** d **13.** b **14.** yes **15.** b

16. 0.6130 **17.** e **18.** 26.1