

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

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1 A colony of bacteria starts with 470 organisms and doubles every week. How many bacteria will there be after 6 weeks?

a.  $P = 16000$  bacteria

b.  $P = 30080$  bacteria

c.  $P = 28800$  bacteria

d.  $P = 30720$  bacteria

2 A sum of \$2200 is invested in an account that pays 6% interest compounded annually. How much is in the account after 6 years?

a.  $A = \$3716.85$

b.  $A = \$2944.10$

c.  $A = \$3120.74$

d.  $A = \$3939.86$

3 Solve the equation:

$$8 \cdot 2^{(-2x)} = 4^{(x+11)}$$

4 Find the second coordinate of the  $y$ -intercept of this exponential function.

$$f(x) = 30(1.3)^x$$

5 Solve this equation algebraically.

$$64^{4x+1} = 256^{x-1}$$

6 Choose the value(s) of  $x$  where  $f(x) = g(x)$ .

$$f(x) = 3^{x-1}, \quad g(x) = 3^x - 2$$

a.  $-2$

b.  $0$

c.  $4$

d.  $1$

e.  $2$

f.  $-4$

7 Evaluate:

$$\log_5 \frac{1}{125}$$

8 Rewrite the equation in logarithmic form.

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

9 Convert the equation to exponential form:

$$\log_{10} 0.0001 = z$$

10 Rewrite the equation in logarithmic form.

$$t^{7/2} = 11$$

a.  $\log_t 11 = \frac{2}{7}$

b.  $\log_{11} t = \frac{7}{2}$

c.  $\log_t 11 = \frac{7}{2}$

d.  $\log_t \frac{7}{2} = 11$

11 Use a graph to approximate the logarithm to the nearest hundredth. (Hint: Graph an appropriate function  $y = b^x$ .)

$$\log_{10} 6$$

12 Convert the logarithmic equation to exponential form.

$$\log_{14} 196 = w$$

a.  $14^w = \frac{1}{196}$

b.  $\left(\frac{1}{14}\right)^w = 196$

c.  $14^w = 196$

d.  $196^w = 14$

13 Simplify the expression.

$$\log_2 (\log_3 9)$$

a.  $\log_6 9$

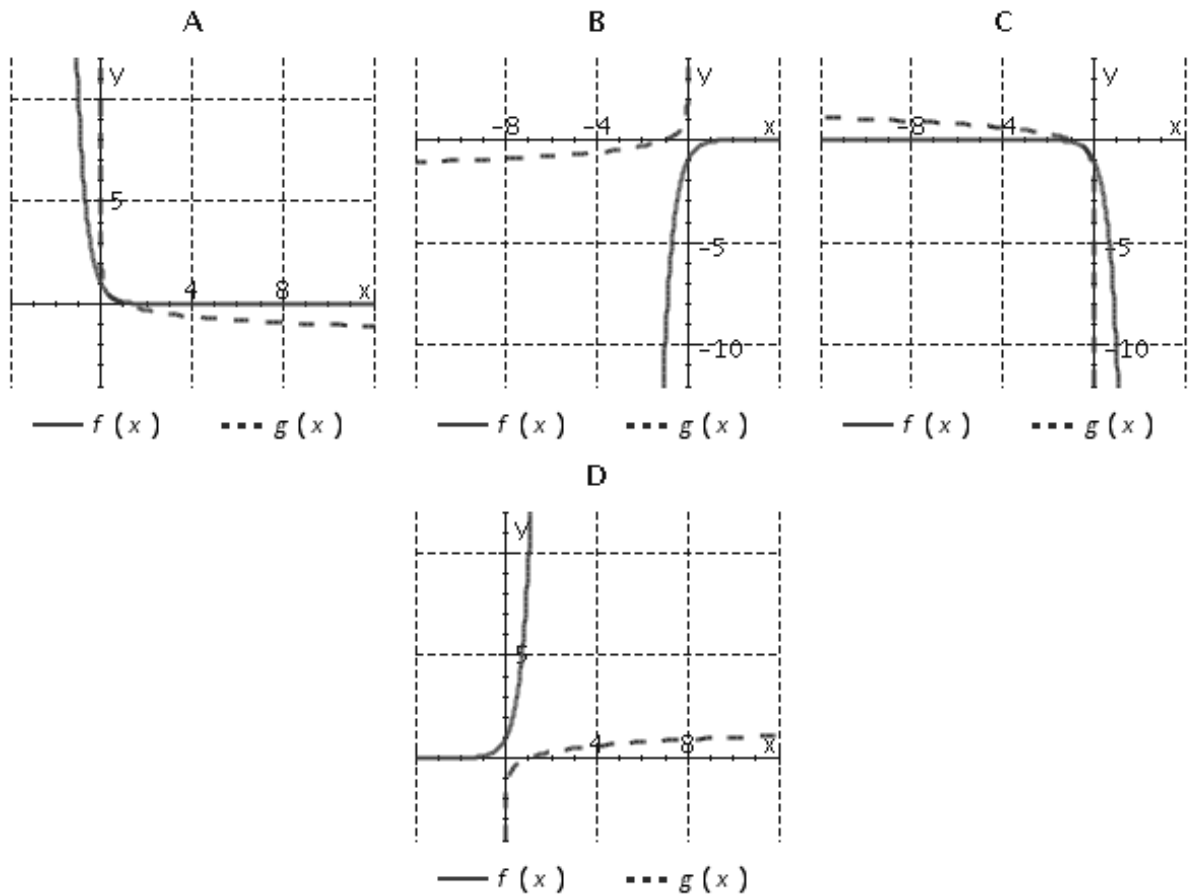
b.  $\log_3 18$

c.  $\log_2 27$

d. 1

14 The four figures below graph the function  $f(x) = 10^x$  and its inverse  $g(x) = \log_{10} x$  on the same axes.

Select the figure which correctly graphs the function and its inverse.



15 Evaluate the expression:

$$T = \frac{\log_{10} \left( \frac{M_f}{M_0} + 1 \right)}{k}$$

where  $k = 0.027$ ,  $M_f = 1827$ , and  $M_0 = 15.2$ .

16 Solve for  $x$ .  $1.5 = \log_{10} x$

Round your answer to two decimal places.

17 Solve for  $x$ .

$$2.4 = 4e^{2.5x} + 1.2$$

Round the solution to two decimal places.

18 The population of Citrus Valley was 20000 in 1980. In 1990 it was 45000. If it continues at the same rate of growth, what will the population be in 2007? Round the result to the nearest integer.

19 The population of the town was 23500 in 1980. In 1986 it was 32000.

If it continues at the same rate of growth, what will the population be in 2004? Assume that the population grows according to a growth law of the form

$$P(t) = P_0 e^{kt}$$

First find  $P_0$  if  $t = 0$  in 1980, then use that value to find your answer. Round to the nearest integer.

a.  $P = 31607$

b.  $P = 80797$

c.  $P = 30619$

d.  $P = 32432$

20 All living things contain a certain amount of the isotope carbon – 14. When an organism dies, the carbon – 14 decays according to the formula

$$N(t) = N_0 e^{-0.000124t}$$

where  $t$  is measured in years. Scientists can estimate the age of an organic object by measuring the amount of carbon – 14 remaining.

When ancient scrolls were discovered in 1950, they had 73.3% of their original carbon – 14. How old were the scrolls then? Round to the nearest integer.

## ANSWER KEY

### Ch 7

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|------------------------|--------------------|--------------------|------------|-------------------|----------|------------------|
| 1. b                   | 2. c               | 3. $-\frac{19}{4}$ | 4. 30      | 5. $-\frac{7}{8}$ | 6. d     | 7. $\frac{1}{3}$ |
| 8. $\log(3, 1/9) = -2$ | 9. $10^z = 0.0001$ | 10. c              | 11. 0.78   | 12. c             | 13. d    | 14. D            |
| 15. 77.15              | 16. 31.62          | 17. $x = -0.48$    | 18. 178602 | 19. b             | 20. 2505 |                  |