

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

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

1. What is the value of the expression?

$$\sqrt{64x^{16}y^4}$$

- A.  $8x^4y^2$                       B.  $8x^8y^2$   
C.  $32x^4y^2$                       D.  $32x^8y^2$

2. Rewrite
- $\sqrt[3]{x^3 + 3x^2 + 3x + 1}$
- in simplest form.

3. Which expression is equivalent to
- $(\sqrt{2x^2})^4$
- ?

- A.  $2x^4$     B.  $4x^4$     C.  $4x^8$     D.  $8x^8$

4. Simplify:
- $\sqrt[3]{125x^3y^6z^9}$

- A.  $5x^2z^3$                       B.  $5xy^3z^6$   
C.  $5xy^2z^3$                       D.  $25xy^3z^3$

5.  $\sqrt{4x^4} =$

- A. 2            B.  $2x$             C.  $4x$             D.  $2x^2$

6. If
- $17^m = 6$
- , what is
- $m$
- ?

- A.  $m = \frac{\log 6}{\log 17}$                       B.  $m = \log 6 - \log 17$   
C.  $m = \frac{\log 17}{\log 6}$                       D.  $m = \log \frac{6}{17}$

7.  $\log_6 40 =$

- A.  $\log_{10} 6 + \log_{10} 40$             B.  $\log_{10} 6 - \log_{10} 40$   
C.  $(\log_{10} 6)(\log_{10} 40)$             D.  $\frac{\log_{10} 40}{\log_{10} 6}$

8. Which of the following is a simplified form of the expression
- $\log_{21} 5 + \log_{21} 4 - \log_{21} 2$
- ?

- A.  $\log_{21} 10$                       B.  $\log_{10} 21$   
C.  $\log_{21} 7$                         D.  $\log_7 21$

9. Which expression is the simplified version of  $\log x + \log y - k \log r$ ?

- A.  $\log\left(\frac{xy}{r^k}\right)$       B.  $\frac{\log(x+y)}{r^k}$   
C.  $\log(x+y-r^k)$       D.  $\log(x+y) - k \log r$

10. Which equation is equivalent to  $3 \log x + \log 2 = \log 3x - \log 2$ ?

- A.  $\log x^3 + 2 = \log(3x - 2)$   
B.  $\log(3x + 2) = \log(3x - 2)$   
C.  $\log 6x = \log\left(\frac{3x}{2}\right)$   
D.  $\log(2x^3) = \log\left(\frac{3x}{2}\right)$

11. If  $y = 4(1.6)^x$ , what is the *approximate* value of  $x$  when  $y = 12$ ?

- A. 2.5      B. 2.3      C. 2.1      D. 1.9

12. Solve for  $x$ :  $6^{3x} = 30$

- A.  $x = 3 \ln 5$       B.  $x = \ln 30 - 3 \ln 6$   
C.  $x = \frac{\ln 10}{\ln 6}$       D.  $x = \frac{\ln 30}{3 \ln 6}$

13. What is the solution to the equation  $5^x = 17$ ?

- A.  $x = 2$   
B.  $x = \log_{10} 2$   
C.  $x = \log_{10} 17 + \log_{10} 5$   
D.  $x = \frac{\log_{10} 17}{\log_{10} 5}$

14. Which value of  $x$  is the solution to  $100^{x+6} = 1000^{2x+3}$ ?

- A.  $\frac{3}{10}$       B.  $\frac{3}{4}$       C. 3      D. 30

15. What is the *approximate* solution to the equation  $3^{x-1} = 4^{2x+5}$ ?

- A. 3.875      B. 1.262  
C. -2.354      D. -4.797

16. Solve:  $y = \log(5x + 3)$  for  $x$

- A.  $x = 10^{\frac{1}{5}}(y - 3)$       B.  $x = \frac{1}{5}(y - 3)$   
C.  $x = \frac{1}{5}(10^y - 3)$       D.  $x = 5(10^y - 3)$

17. If  $\log_x y = 2$ , which of the following is true?

- A.  $y = x^2$                       B.  $y = 2x$   
C.  $x = y^2$                       D.  $x = 2y$

18. What is the value of  $\log_3 27$ ?

- A. 2      B. 3      C. 6      D. 9

19. If  $\log 2 \approx 0.301$  and  $\log 3 \approx 0.477$ , what is the approximate value of  $\log 72$ ?

- A. 0.051    B. 0.778    C. 0.861    D. 1.857

20. Which of these is the value of  $\log_{0.5} 32$ ?

- A. -5      B. 5      C. 16      D. 64

21. What is the equation of the function represented by this table of values?

|     |                |               |   |    |    |
|-----|----------------|---------------|---|----|----|
| $x$ | -2             | -1            | 0 | 1  | 2  |
| $y$ | $\frac{3}{25}$ | $\frac{3}{5}$ | 3 | 15 | 75 |

- A.  $y = 5x + 3$                       B.  $y = 12x + 3$   
C.  $y = 3 \cdot 5^x$                       D.  $y = 5 \cdot 3^x$

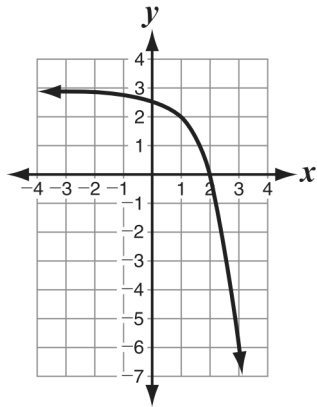
22. Use the table below to answer the following question.

|     |   |    |    |    |     |     |
|-----|---|----|----|----|-----|-----|
| $x$ | 1 | 2  | 3  | 4  | 5   | 6   |
| $y$ | 7 | 14 | 29 | 60 | 123 | 250 |

Which equation describes the relationship between the  $x$  and  $y$  values in the table?

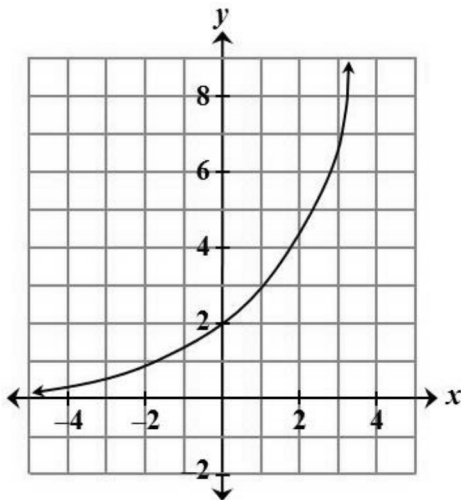
- A.  $y = 7x$                       B.  $y = 2x + 5$   
C.  $y = x(2x - 7)$                       D.  $y = 2^{x+2} - x$

23. Which function is represented by the graph?



- A.  $y = -3^x + 3$       B.  $y = -\left(\frac{1}{3}\right)^x + 3$   
 C.  $y = -3^{x-1} + 3$       D.  $y = -\left(\frac{1}{3}\right)^{x-1} + 3$

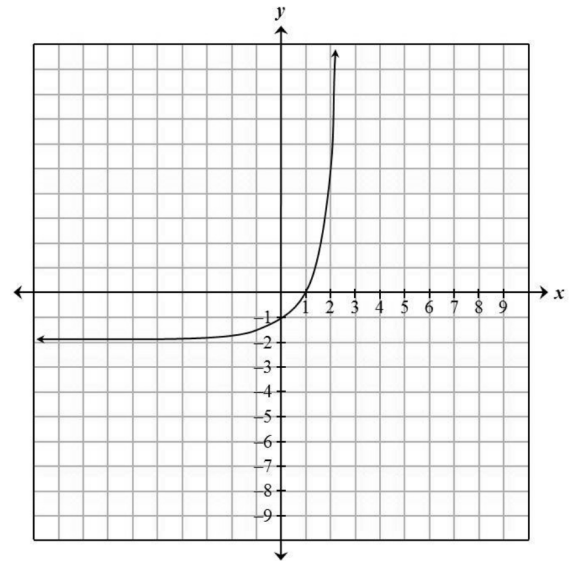
24. The graph shows an exponential function.



What is the equation of the function?

- A.  $y = \left(\frac{2}{3}\right)^x$       B.  $y = 2(3)^x$   
 C.  $y = 2\left(\frac{3}{2}\right)^x$       D.  $y = 3\left(\frac{2}{3}\right)^x$

25. Which function is represented by the graph below?



- A.  $y = e^x - 2$       B.  $y = e^x + 2$   
 C.  $y = 2 - e^x$       D.  $y = -2 - e^x$

26. 100 kilograms of a substance has a half-life of 50 years. If the graph of its decay function is represented by  $y = ab^x$  where  $x$  is the number of 50-year periods, what are the values of  $a$  and  $b$ ?

- A.  $a = 100$  and  $b = 50$   
 B.  $a = 100$  and  $b = 0.5$   
 C.  $a = 50$  and  $b = 0.5$   
 D.  $a = 50$  and  $b = 100$

27. Bacteria in a culture are growing exponentially with time, as shown in the table below.

**Bacteria Growth**

| Day | Bacteria |
|-----|----------|
| 0   | 100      |
| 1   | 200      |
| 2   | 400      |

Which of the following equations expresses the number of bacteria,  $y$ , present at any time,  $t$ ?

- A.  $y = 100 + 2^t$       B.  $y = (100) \cdot (2)^t$   
 C.  $y = 2^t$       D.  $y = (200) \cdot (2)^t$

28. A certain culture of 5,000 bacteria triples every 43 minutes. Let  $B$  = the number of bacteria  $t$  minutes after the start of the count. Which equation models the situation?

- A.  $B = 5000 + 43t$       B.  $B = 43t^2 + 5000$   
 C.  $B = 5000 \cdot 3^{\frac{t}{43}}$       D.  $B = 5000 + 3 \cdot 43t$

29. Which of the following functions will represent \$500 placed into a mutual fund yielding 10% per year for 4 years.

- A.  $A = 500(.10)^4$       B.  $A = 500(1.1)^4$   
 C.  $A = 500(4)(.10)$       D.  $A = 500(1.04)^{10}$

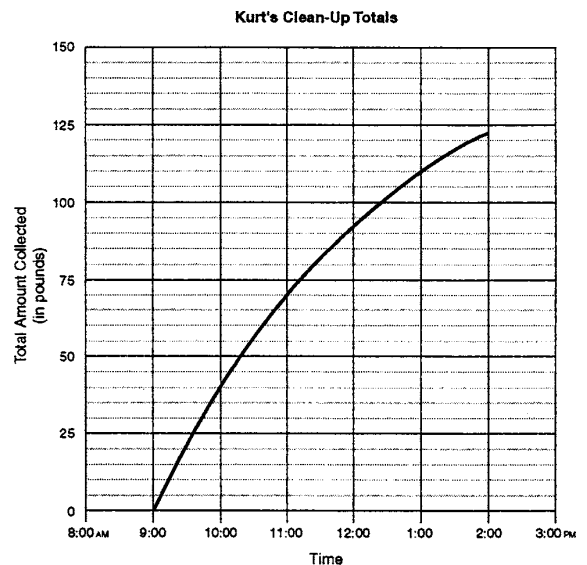
30. The table below shows the relationship between the amount of time in years and the amount of money in a bank account earning 5% interest.

| Time | Money      |
|------|------------|
| 0    | \$2,000.00 |
| 1    | \$2,100.00 |
| 2    | \$2,205.00 |
| 3    | \$2,315.00 |

If no additional deposits or withdrawals are made, which function shows the account balance after  $t$  years?

- A.  $f(t) = 2,000(1 + 0.05)^t$   
 B.  $f(t) = 2,000(1 + 5)^t$   
 C.  $f(t) = 2,000(t)^{0.05}$

31. Kurt is keeping the track of the total number of pounds of garbage he has collected as the day progresses. The graph below shows this information.



If the pattern shown in the graph continues, about how many pounds of garbage will Kurt have collected by 3:00 pm.

32. An \$18,000 car depreciates at a rate of 16% per year. How old will the car be when it is worth \$12,000?

- A. 0.2 years                      B. 2.3 years  
C. 2.6 years                      D. 3 years

33. There are 6 snakes in a certain valley. The population of snakes doubles every year. In how many years will there be 96 snakes?

- A. 2                      B. 3                      C. 4                      D. 8

34. A solution's pH is given by the function  $p(t) = -\log(t)$ , where  $t$  is the hydronium ion concentration, in moles per liter. A sample of coffee has a pH of 5.0. What is the *approximate* hydronium ion concentration of the sample?

- A. 0.000001                      B. 0.00001  
C. 0.0001                      D. 0.001

35. A couple wants to buy a house in five years. They need to save a down payment of \$8,000. They deposit \$1,000 in a bank account earning 3.25% interest, compounded quarterly. How much will they need to save each month in order to meet their goal?

36. Which equation is equivalent to  $\log_3 \frac{1}{9} = x$ ?

- A.  $\frac{1^3}{9} = x^3$                       B.  $(\frac{1}{9})^3 = x$   
C.  $3^x = \frac{1}{9}$                       D.  $3^{\frac{1}{9}} = x$

37. A student showed the following steps in his solution of the equation below, but his answer was not correct.

$$\log_5(2x^2 - 3x + 1) - \log_5(x - 1) + \log_5 125 = 6$$

Step 1:  $\log_5(2x - 1)(x - 1) - \log_5(x - 1) + 3 = 6$

Step 2:  $\log_5(2x - 1)(x - 1) - \log_5(x - 1) = 3$

Step 3:  $\log_5(x - 1) = 3$

Step 4:  $x - 1 = 125$

Step 5:  $x = 126$

In which step did he make his first error?

- A. Step 1                      B. Step 2  
C. Step 3                      D. Step 4

38. Mason is buying a new car and wants to figure out what his monthly payment will be.

The formula for the monthly payment  $P$  can be written as  $P = \frac{rA}{1 - (1 + r)^{-N}}$ , where  $r$  is the interest rate per period,  $A$  is the amount of the loan, and  $N$  is the total number of  $I$  payments for the loan.

As  $N$  increases, what happens to the denominator of the formula?

- A. The denominator decreases, then increases.
- B. The denominator increases, then decreases.
- C. The denominator decreases.
- D. The denominator increases.

39. What is the inverse of  $y = \ln(x - 15) + 3$ ?

- A.  $y = e^{x-3} + 15$
- B.  $y = e^x + 12$
- C.  $y = e^{x+12} + 15$
- D.  $y = e^{x-15} + 3$

40. The number of bacteria present in a laboratory sample after  $t$  days can be represented by  $500(2^t)$ . What is the initial number of bacteria present in this sample?

- A. 250
- B. 500
- C. 750
- D. 1000

Test is one week from today      Practice Test: Exponents and Logarithms      11/12/2018

- |                       |                       |
|-----------------------|-----------------------|
| 1.<br>Answer:      B  | 21.<br>Answer:      C |
| 2.<br>Answer:         | 22.<br>Answer:      D |
| 3.<br>Answer:      B  | 23.<br>Answer:      C |
| 4.<br>Answer:      C  | 24.<br>Answer:      C |
| 5.<br>Answer:      D  | 25.<br>Answer:      A |
| 6.<br>Answer:         | 26.<br>Answer:        |
| 7.<br>Answer:      D  | 27.<br>Answer:      B |
| 8.<br>Answer:      A  | 28.<br>Answer:      C |
| 9.<br>Answer:      A  | 29.<br>Answer:        |
| 10.<br>Answer:      D | 30.<br>Answer:        |
| 11.<br>Answer:        | 31.<br>Answer:        |
| 12.<br>Answer:      D | 32.<br>Answer:        |
| 13.<br>Answer:      D | 33.<br>Answer:      C |
| 14.<br>Answer:      B | 34.<br>Answer:      B |
| 15.<br>Answer:      D | 35.<br>Answer:        |
| 16.<br>Answer:        | 36.<br>Answer:      C |
| 17.<br>Answer:      A | 37.<br>Answer:      C |
| 18.<br>Answer:      B | 38.<br>Answer:      D |
| 19.<br>Answer:      D | 39.<br>Answer:      A |
| 20.<br>Answer:      A | 40.<br>Answer:      B |