

Exponentials and Logarithms Review

Name: _____

Date: _____

1. Refer to Lessons 1 and 2 for help. This problem set is to be done WITHOUT a calculator. This problem is NOT multiple choice. Answer all five.

For items a. through e., determine whether each equation is **True** or **False**.

- a. $\sqrt{32} = 2^{\frac{5}{2}}$ ☐ True ☐ False
 b. $16^{\frac{3}{2}} = 8^2$ ☐ True ☐ False
 c. $4^{\frac{1}{2}} = \sqrt[4]{64}$ ☐ True ☐ False
 d. $2^8 = (\sqrt[3]{16})^6$ ☐ True ☐ False
 e. $(\sqrt{64})^{\frac{1}{3}} = 8^{\frac{1}{6}}$ ☐ True ☐ False

2. Refer to Lesson 3 for help.

The equation $h = 241m^{\frac{-1}{4}}$ predicts a mammal's heart rate, h , in beats per minute, based on the mammal's mass, m , in kilograms. What is the *approximate* heart rate, in beats per minute, of a polar bear with a mass of 326 kilograms?

- A. 57 B. 67 C. 82 D. 92

3. Refer to Lesson 10 for help.

$$\log_6 40 =$$

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

4. Refer to Lesson 10 for help.

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. $\log_7 21$

5. Refer to Lesson 10 for help.

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. $\log(x+y) - k \log r$

6. Refer to Lesson 11 for help.

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. Refer to Lesson 5 for help.

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

8. 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

9. Refer to Lesson 11 for help.

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. $x = \frac{\ln 30}{3 \ln 6}$

10. Refer to Lesson 8 for help.

What is the logarithmic form of the equation $y = 20^{\frac{-3}{2}}$?

- A. $\log_{20} y = \frac{-3}{2}$ B. $\log_{\frac{3}{2}} 20 = y$
C. $-\log_{\frac{3}{2}} y = 20$ D. $\log_{20}(\frac{-3}{2}) = y$

11. Refer to Lesson 8 for help.

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

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

12. Refer to Lesson 10 for help. This exercise is to be done **WITHOUT** a calculator.

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

13. Refer to Lesson 10 for help. This exercise is to be done **WITHOUT** a calculator.

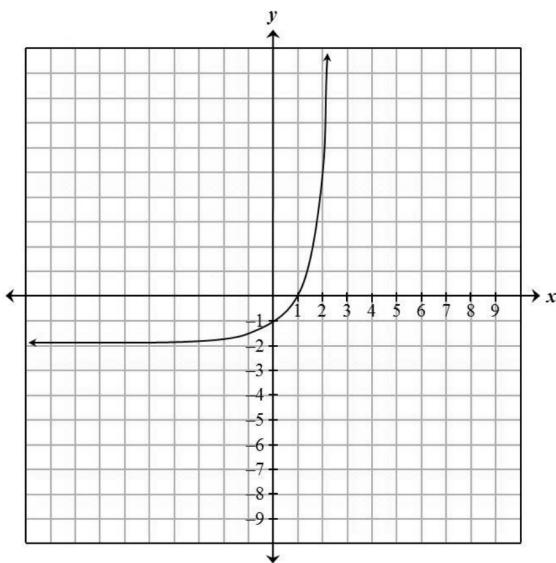
What is the solution to the equation?

$$\log_2 8 + \log_2 32 = x$$

- A. 4 B. 8 C. 40 D. 256

14. Refer to Lesson 12 for help.

Which function is represented by the graph below?



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

15. Refer to Lesson 4 for help.

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. $y = (200) \cdot (2)^t$

16. Refer to Lesson 4 for help.

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. $A = 500(1.04)^{10}$

17. Refer to Lesson 11 for help.

Isabella invested \$500 at 6% annual interest, compounded quarterly. The value, A , of an investment can be calculated using the equation $A = P \left(1 + \frac{r}{n}\right)^{nt}$ where P is the initial investment, r is the interest rate, n is the number of times the interest is compounded each year, and t is time in years. Exactly how long will it take for her investment to be worth four times as much (quadruple) in value?

- A. $t = \frac{\log 500}{4 \log 1.06}$ B. $t = \frac{\log 500}{4 \log 0.265}$
C. $t = \frac{4 \log 4}{\log 1.015}$ D. $t = \frac{\log 4}{4 \log 1.015}$

18. Refer to Lesson 4 for help.

A patient is given a 100-milligram dosage of a drug that decays exponentially, with a half-life of 6 hours. Which equation could be used to find the milligrams of drug remaining (y) after x hours?

- A. $y = 100(6)^{0.5x}$ B. $y = 100(x)^{0.5/6}$
C. $y = 100(0.5)^{x/6}$ D. $y = 100(0.5x)^{1/6}$

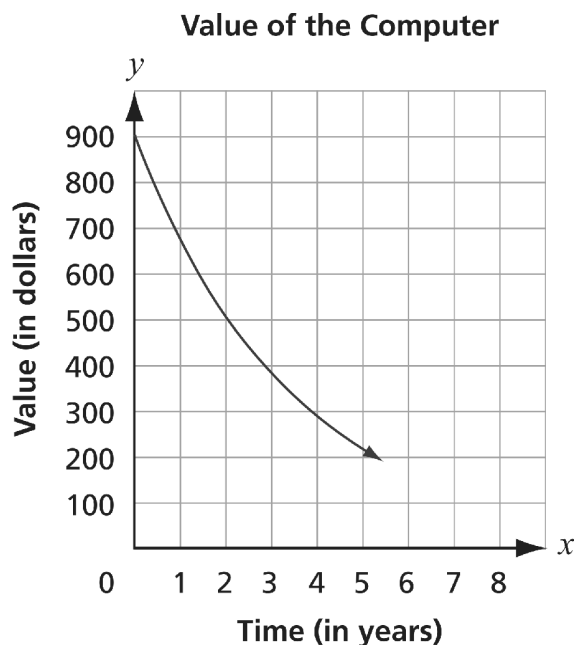
19. Refer to Lesson 11 for help.

A \$2,000 bicycle depreciates at a rate of 10% per year.

After how many years will it be worth less than \$1,000?

- A. 5 years B. 7 years
C. 10 years D. 100 years

20. Refer to Lessons 3 and 4 for help.



Dan bought a new computer for \$900. Each year, the value of the computer decreased by 25% of the previous year's value. At this rate, what can Dan expect the approximate value of the computer to be after 8 years?

- A. \$84 B. \$90 C. \$100 D. \$113

21. Refer to Lesson 12 for help.

An exponential growth formula is $N = N_0 e^{kt}$, where:

N is the population at time t ,

N_0 is the initial population,

k is the growth rate, and

t is the time in years.

The enrollment of a school has been increasing exponentially at a rate of 1.5% per year. The school's enrollment now is 1,800. *Approximately* how long ago was the school's enrollment 1,200?

- A. 27 years B. 20 years
C. 12 years D. 3 years

22. Refer to Lesson 10 for help.

Which is the first *incorrect* step in simplifying $\log_4 \frac{4}{64}$?

Step 1: $\log_4 \frac{4}{64} = \log_4 4 - \log_4 64$

Step 2: $= 1 - 16$

Step 3: $= -15$

- A. Step 1
B. Step 2
C. Step 3
D. Each step is correct.

23. Refer to Lesson 8 for help.

What is the inverse function for the exponential function which includes the points shown in the table below?

x	1	2	3	4	5
$f(x)$	5	25	125	625	3,125

- A. $f^{-1}(x) = \log_5 x^2$ B. $f^{-1}(x) = 5 \log_5 x$
 C. $f^{-1}(x) = \log_5 2x$ D. $f^{-1}(x) = \log_5 x$

24. Refer to Lesson 5 for help.

An equation is shown below.

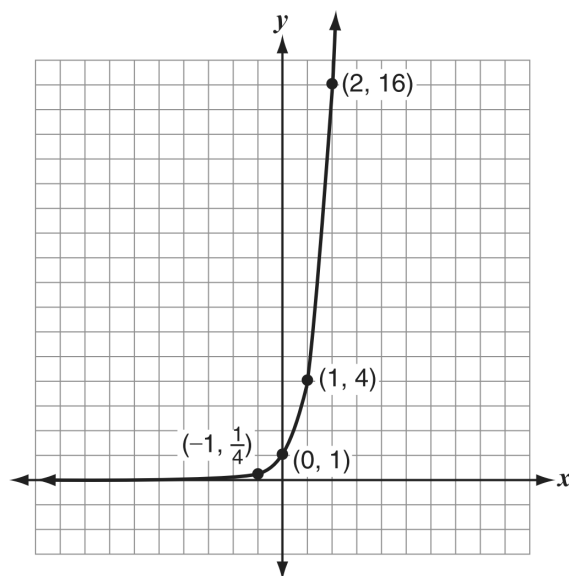
$$3^{5x} = 9^{2x-1}$$

Which equation has the same solution?

- A. $3x = 10x - 5$ B. $5x = 4x - 2$
 C. $8x = 11x - 1$ D. $15x = 18x - 9$

25. Refer to Lesson 3 for help.

The graph of a function is shown below.



Which table represents the same function?

A.

x	y
-4	$\frac{1}{256}$
-3	$\frac{1}{64}$
-2	$\frac{1}{16}$

B.

x	y
-4	$\frac{1}{32}$
-3	$\frac{1}{16}$
-2	$\frac{1}{8}$

C.

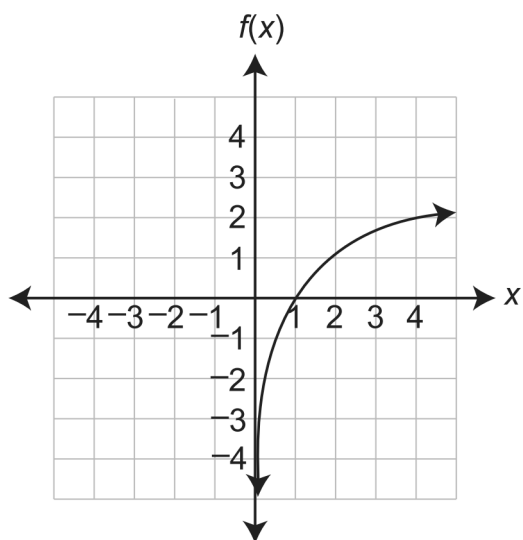
x	y
3	32
4	64
5	128

D.

x	y
3	64
4	256
5	512

26. Refer to Lesson 9 for help.

A logarithmic function is graphed below.



What is the value of $f(8)$?

- A. 3 B. 4 C. 16 D. 256

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1.
Answer: True; True; False; True; False

2.
Answer: A

3.
Answer: D

4.
Answer: A

5.
Answer: A

6.
Answer:

7.
Answer: B

8.
Answer:

9.
Answer: D

10.
Answer: A

11.
Answer: A

12.
Answer: D

13.
Answer: B

14.
Answer: A

15.
Answer: B

16.
Answer:

17.
Answer: D

18.
Answer: C

19.
Answer: B

20.
Answer: B

21.
Answer: A

22.
Answer: B

23.
Answer: D

24.
Answer: B

25.
Answer: A

26.
Answer: A