

7.E Applications of Logs	Name
Evaluate the expression. Simplify the result.	(No Calculator 1-6)
1. $\log_2 24 + \log_2 16 - \log_2 6$	2. $\log_7 7 + \log_3 1$
3. $\log_4 \frac{1}{16}$	4. $\log_5 \sqrt{5}$ (Hint: Write in exponential form.)
5. $\log_3 9 + \log_3 27$	6. Solve for x: $\log_3 4x = 2$
7. Solve for x: $\ln(4x) - \ln(2) = 0$	8. Solve for x $5e^{4x} + 2 = 14$ a. 0.124                      b. -0.243                      c. 0.219                      d. 0.291
9. Solve for x: Solve $\ln 2 + \ln x = 5$ . a. 50,000                      b. 74.2                      c. 10                      d. 3	10. Solve for x: Solve $2 \log 4 - \log 3 + 2 \log x - 4 = 0$ . a. 12.3308                      b. 43.3013                      c. 86.6025                      d. 1875

The table shows some notable earthquakes that occurred in recent years. How many times more energy was released by the earthquake in Mexico than by the earthquake in Italy?

Earthquake Location	Date	Richter Scale Measure
Italy	October 31, 2002	5.9
El Salvador	February 13, 2001	6.6
Afghanistan	May 30, 1998	6.9
Mexico	January 22, 2003	7.6
Arequipa, Peru	June 23, 2001	8.1

[Source: *World Almanac 2004*, p. 190]

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|------------------------------------|--------------------------------------|
| a. about 1.70 times as much energy | c. about 324.42 times as much energy |
| b. about 51 times as much energy   | d. about 79.93 times as much energy  |

12. Find the Intensity of an earthquake measuring 8.1 on the Richter scale. Can use $R = \log I$	12. b. What would the Richter Scale value of an earthquake which had an intensity of 9,245,050?
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<p>13. A virus is doubling how many people it contaminates twice an hour. If it started at 8am by contaminating 3 people, what would the equation be?</p> <p>How many hours before 200,000 people are exposed to the virus?</p> <p>What is the time?</p>	<p>14. If X grams of a substance is decaying to half the amount once every 26 hours, and 8.3 grams are left in 60 hours, how many grams was the Original substance?</p>
<p>15. The Population of people in Arizona is given by the equation <math>A = .78e^{rt}</math>, where t = 0 represents 1950 and the population is in millions. The population in 2000 is 5.16 million. What is the growth rate in Arizona?</p> <p>Use the growth rate above to predict the population of Arizona in 2015.</p>	<p>16. Solve for x:  <math>\frac{1}{4}\log_2 x - 3 = a</math></p>

17.

The generation time  $G$  for a particular bacteria is the time it takes for the population to double. If the generation time for the bacteria is 3.5 hours, how long will it take 8 of these bacteria to multiply into a colony of 8212 bacteria? Round to the nearest hour.

- a. 2 hours                      b. 45 hours                      c. 104 hours                      d. 50 hours

18.

**The pH of a liquid is a measure of how acidic or basic it is. The concentration of hydrogen ions in a liquid is labeled  $[H^+]$ . Use the formula  $pH = -\log [H^+]$  to answer questions about pH.**

Find the pH level, to the nearest tenth, of a liquid with  $[H^+]$  about  $7.4 \times 10^{-10}$ .

- a. 9.1                      b. 10.0                      c. 10.9                      d. -10.9

<p>19. Solve for x:  <math>14^x + 2 = 82</math></p>	<p>20. Solve for x  <math>\log_4(x - 5) = 2</math></p>
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21. Graph  $f(x) = 4 \cdot 2^x - 1$

Equation of Asymptote

Domain:

Range

Y-Intercept ( , )

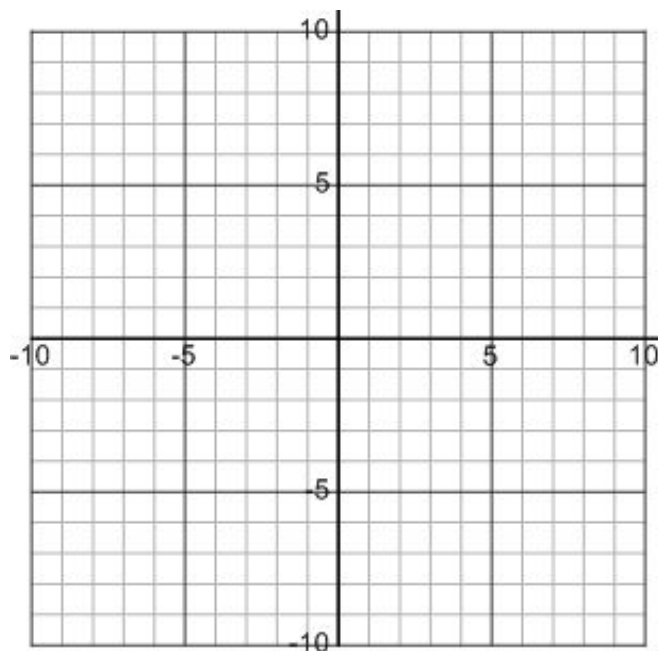
22. Graph  $g(x) = \log_2(x - 5)$

Equation of Asymptote:

Domain:

Range:

X-Intercept: ( , )



23. Find all the solutions of the equation on  $0 \leq x < 360^\circ$  and  $0 \leq x < 2\pi$ .

$$2\sin^2 x = 1$$

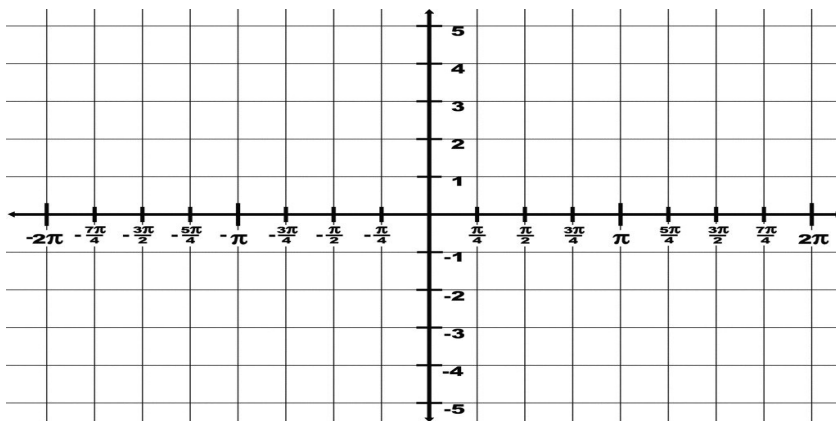
24. Simplify the following expression. (Your answer should only contain positive exponents.)

$$(5x^{-7}y^{-2}z^4)^{-2}$$

25. Using  $y = 3\sin(2x) + 1$

Write an equation with half the amplitude and period length is twice the length above. (Going half as fast.)

Graph the equation



26. You deposit some money in an investment. Here is the data from your investment:

years	Dollars
0	20,000
1	20,950
2	21,945
3	22988

What is the equation for your investment?

What is your interest Rate?

How much will you have in the account if it continues this trend in 10 years?

27. Using synthetic division, find the value of  $a$  that would make  $x-6$  a factor of  $f(x) = x^3 - x^2 - 24x - a$