

All Work Should Be Done on a Separate Sheet of Paper (except graphs)**Find the value of x that satisfy each of the following:**

1. $2^{3x} = 4^{x+1}$

2. $25^x = 5^{3x-5}$

3. $\frac{1}{64} = 4^{2x+1}$

4. $27^{3x+4} = 9^{2x-1}$

5. $\left(\frac{1}{32}\right)^{x+3} = 16^{2x-4}$

6. $8^{7x-2} = 16^{4x}$

7. a. On the accompanying grid, sketch the graphs of $y = 2^x$ and $y = \left(\frac{1}{2}\right)^x$

b. Give the domain and range for each function.

8. Which of the following is *not* in the domain of $y = 9^x$?

- (1) -1 (2) 0 (3) 1 (4) they are all in the domain

9. Which of the following is *not* in the range of $y = 4^x$?

- (1) 0 (2) 5 (3) 1 (4) they are all in the range

10. Express each of the following as a fraction in simplest form:

- a. If
- $f(x) = 2^x$
- , find
- f^{-3}
- . b. If
- $f^{-x} = 16^x$
- , find
- $f\left(-\frac{1}{2}\right)$
- .

For each of the following (#11-13) exponential functions below:**a. identify the initial value,****b. tell if the function is increasing or decreasing,****c. tell the percent of increase or decrease.**

11. $y = 624(1.03)^x$

12. $B(t) = 98 \cdot 0.97^t$

13. $A(t) = 700 \cdot 1.107^x$

14. The population of Munsonland grows by approximately 4.5% each year. If in 1995 there were 152 residents living in Munsonland, answer the following questions.

a. Write a formula, $P(t)$, that gives the population P at time t .

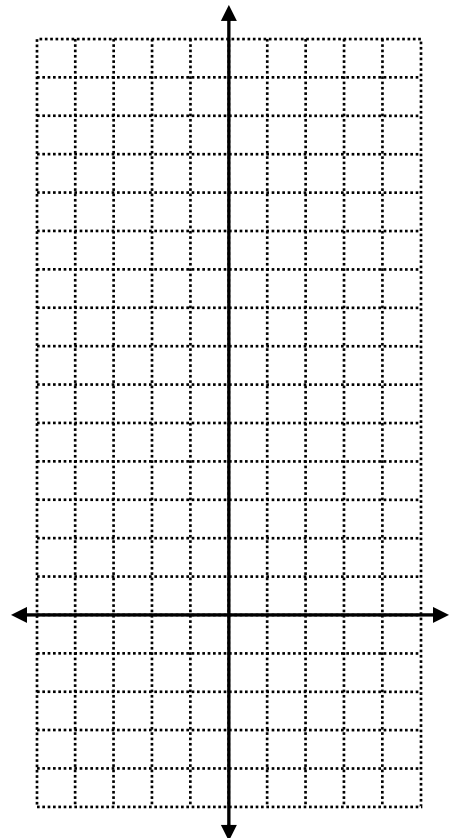
b. What is the population of Munsonland in the year 1999?

c. What is the population of Munsonland in the year 2006?

15. Suppose you deposit \$400 in an account with an annual interest rate of 3% compounded quarterly. How much money will you have after 5 years?

16. Michelle deposited \$1750 into a money market account with an annual interest rate of 15% compounded monthly. How much money will Michelle have after 8 years?

17. Suppose that Merkley has \$1200 to invest in one of three banks. Bank A offers an APR of 6.5%, compounded annually. Bank B offers an APR of 6% compounded monthly. Bank C charges a one-time fee to open an account of \$50 and offers an APR of 8% compounded quarterly. If Merkley only plans to leave his money in the bank for 6 years, which bank should he choose?



18. The amount of money, E , in billions spent on health care expenditures can be estimated using the function $E = 78.16 \cdot 1.11^t$, where t is time in years since 1970 (U.S. Census Bureau).
- What were the health care expenditures in 1970?
 - Is the cost increasing or decreasing?
 - By what percent is the cost increasing or decreasing?
 - What were the health care expenditures in 1990?
 - What are the expected health care expenditures in 2010?
19. Daisy decides to invest her money in her friend Ira's company. Daisy's money can be modeled by the equation $D(t) = 7000(0.87)^t$.
- How much did Daisy invest originally?
 - Is her money increasing or decreasing?
 - By what percent is her money increasing or decreasing?
 - How much money will Daisy have in 10 years?
20. Express $\log\left(\frac{\sqrt{x}}{y^3}\right)$ in terms of $\log x$ and $\log y$.
21. If $\log 3 = p$ and $\log 2 = q$ then which of the following is equivalent to $\log 18$?
- $p + q$
 - $p - 2q$
 - $2p + q$
 - $p + 2q$
22. Which of the following is equivalent to $\log_2\left(\frac{\sqrt{y}}{16}\right)$?
- $\sqrt{2}y + 4$
 - $\frac{y}{2} - 4$
 - $\frac{\log_2 y}{2} - 4$
 - $2\log_2 y + 4$
23. The expression $\log 24$ is equivalent to
- $3\log 3 + \log 2$
 - $3\log 2 + \log 3$
 - $\log 3 - 2\log 2$
 - $3\log 3 - 2\log 2$
24. The expression $3\log x - \frac{1}{2}\log y$ is equivalent to
- $\log\left(\frac{3x}{2y}\right)$
 - $\log\left(\frac{x^3}{2y}\right)$
 - $\log\left(\frac{x^3}{\sqrt{y}}\right)$
 - $\log x^3 \sqrt{y}$
25. If $\log 7 = p$ then $\log 49,000$ can be expressed as
- $2p + 3$
 - $2p - 3$
 - $p + 5$
 - $p - 3$
26. If $f(x) = \log(x^3)$ and $g(x) = 10x$ then which of the following is equivalent to $f(g(x))$?
- $3(1 + \log x)$
 - $3 - \log x$
 - $3\log x + 1$
 - $3\log x - 3$
27. If $\log_m x = a$, $\log_m y = b$, and $\log_m z = c$, express the following in terms of a , b , and c .
- $\log_m x^4 \cdot \sqrt[3]{y^5}$
 - $\log_m \left(\frac{x^4 \sqrt{y}}{\sqrt[5]{z^3}}\right)$
28. Write each expression as a single logarithm.
- $5\log x + 2\log y - \frac{1}{6}\log z$
 - $7\log b + \log c - \frac{1}{2}\log a$