

Exercises

Communicate

1. What type of values of n are possible in the bacterial growth expression $25 \cdot 2^n$ and in the United States population growth expression $248,718,301 \cdot (1.08)^n$?
2. Explain how the United States population growth expression $248,718,301 \cdot (1.08)^n$ incorporates the growth rate of 8% per decade.
3. What assumption(s) do you make about a population's growth when you make predictions by using an exponential expression?
4. Describe the difference between the procedures for finding the multiplier for a growth rate of 5% and for a decay rate of 5%.

Guided Skills Practice

Find the multiplier for each rate of exponential growth or decay.

(EXAMPLES 1 AND 2)

5. 5.5% growth 6. 0.25% growth 7. 3% decay 8. 0.5% decay

Evaluate each expression for $x = 3$. (EXAMPLES 1 AND 2)

9. 2^x 10. $50(3)^x$ 11. 0.8^x 12. $100(0.75)^x$

APPLICATIONS

13. **DEMOGRAPHICS** The population of Tokyo-Yokohama, Japan, was about 28,447,000 in 1995 and was projected to grow at an annual rate of 1.1%. Predict the population, to the nearest hundred thousand, for the year 2004. [Source: U.S. Census Bureau] (EXAMPLE 1)
14. **HEALTH** A certain medication is eliminated from the bloodstream at a rate of about 12% per hour. The medication reaches a peak level in the bloodstream of 40 milligrams. Predict the amount, to the nearest tenth of a milligram, of the medication remaining 2 hours after the peak level and 3 hours after the peak level. (EXAMPLE 2)

Practice and Apply

Find the multiplier for each rate of exponential growth or decay.

15. 7% growth 16. 9% growth 17. 6% decay
18. 2% decay 19. 6.5% growth 20. 8.2% decay
21. 0.05% decay 22. 0.08% growth 23. 0.075% growth

Given $x = 5$, $y = \frac{3}{5}$, and $z = 3.3$, evaluate each expression.

24. 2^x 25. 3^y 26. 2^{2x}
27. $50(2)^{3x}$ 28. $25(2)^z$ 29. $25(2)^y$
30. $100(3)^{x-1}$ 31. $10(2)^{z+2}$ 32. 2^{2y-1}
33. $100(2)^{4z}$ 34. $100(0.5)^{3z}$ 35. $75(0.5)^{2y}$

