

9-6 Practice**Exponential Growth and Decay**

- 1. INVESTING** The formula $A = P\left(1 + \frac{r}{2}\right)^{2t}$ gives the value of an investment after t years in an account that earns an annual interest rate r compounded twice a year. Suppose \$500 is invested at 6% annual interest compounded twice a year. In how many years will the investment be worth \$1000?
- 2. BACTERIA** How many hours will it take a culture of bacteria to increase from 20 to 2000 if the growth rate per hour is 85%?
- 3. RADIOACTIVE DECAY** A radioactive substance has a half-life of 32 years. Find the constant k in the decay formula for the substance.
- 4. DEPRECIATION** A piece of machinery valued at \$250,000 depreciates at a fixed rate of 12% per year. After how many years will the value have depreciated to \$100,000?
- 5. INFLATION** For Dave to buy a new car comparably equipped to the one he bought 8 years ago would cost \$12,500. Since Dave bought the car, the inflation rate for cars like his has been at an average annual rate of 5.1%. If Dave originally paid \$8400 for the car, how long ago did he buy it?
- 6. RADIOACTIVE DECAY** Cobalt, an element used to make alloys, has several isotopes. One of these, cobalt-60, is radioactive and has a half-life of 5.7 years. Cobalt-60 is used to trace the path of nonradioactive substances in a system. What is the value of k for Cobalt-60?
- 7. WHALES** Modern whales appeared 5–10 million years ago. The vertebrae of a whale discovered by paleontologists contain roughly 0.25% as much carbon-14 as they would have contained when the whale was alive. How long ago did the whale die? Use $k = 0.00012$.
- 8. POPULATION** The population of rabbits in an area is modeled by the growth equation $P(t) = 8e^{0.26t}$, where P is in thousands and t is in years. How long will it take for the population to reach 25,000?
- 9. DEPRECIATION** A computer system depreciates at an average rate of 4% per month. If the value of the computer system was originally \$12,000, in how many months is it worth \$7350?
- 10. BIOLOGY** In a laboratory, a culture increases from 30 to 195 organisms in 5 hours. What is the hourly growth rate in the growth formula $y = a(1 + r)^t$?