

## 7-8 Practice

### Using Exponential and Logarithmic Functions

- BACTERIA** How many hours will it take a culture of bacteria to increase from 20 to 2000? Use  $k = 0.614$ .
- RADIOACTIVE DECAY** A radioactive substance has a half-life of 32 years. Find the constant  $k$  in the decay formula for the substance.
- 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?
- 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  $k = 0.00012$ .
- 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?
- RADIOACTIVE DECAY** A radioactive element decays exponentially. The decay model is given by the formula  $A = A_0e^{-0.04463t}$ .  $A$  is the amount present after  $t$  days and  $A_0$  is the amount present initially. Assume you are starting with 50g. How much of the element remains after 10 days? 30 days?
- POPULATION** A population is growing continuously at a rate of 3%. If the population is now 5 million, what will it be in 17 years' time?
- BACTERIA** A certain bacteria is growing exponentially according to the model  $y = 80e^{kt}$ . Using  $k = 0.071$ , find how many hours it will take for the bacteria reach a population of 10,000 cells?
- LOGISTIC GROWTH** The population of a certain species of bird in the Everglades can be modeled by the function 
$$p(t) = \frac{16,300}{(1 + 17.5e^{-0.065t})}$$
, where  $t$  is the time in years.
  - What is the maximum population?
  - When does the population reach 16,200?