Exploring Exponential Models

Do only the even problems

Without graphing, determine whether the function represents exponential growth or exponential decay. Then find the *y*-intercept.

7. $y = 0.99\left(\dfrac{1}{3}\right)^x$

8. $y = 20(1.75)^x$

9. $y = 185(\tfrac{5}{4})^x$

10. $f(x) = \dfrac{2}{3}\left(\dfrac{1}{2}\right)^x$

11. $f(x) = 0.25(1.05)^x$

12. $y = \dfrac{1}{5}\left(\dfrac{6}{5}\right)^x$

13. Suppose you deposit \$1500 in a savings account that pays interest at an annual rate of 6%. No money is added or withdrawn from the account.
   a. How much will be in the account after 5 years?
   b. How much will be in the account after 20 years?
   c. How many years will it take for the account to contain \$2500?
   d. How many years will it take for the account to contain \$4000?

Write an exponential function to model each situation. Find each amount after the specified time.

14. A population of 1,236,000 grows 1.3% per year for 10 years.

15. A population of 752,000 decreases 1.4% per year for 18 years.

16. A new car that sells for \$18,000 depreciates 25% each year for 4 years.

For each annual rate of change, find the corresponding growth or decay factor.

17. $+45\%$ **18.** -10% **19.** -40% **20.** $+200\%$

21. $+28\%$ **22.** $+100\%$ **23.** -5% **24.** $+3\%$

25. In 2009, there were 1570 bears in a wildlife refuge. In 2010, the population had increased to approximately 1884 bears. If this trend continues and the bear population is increasing exponentially, how many bears will there be in 2015?

26. The value of a piece of equipment has a decay factor of 0.80 per year. After 5 years, the equipment is worth $98,304. What was the original value of the equipment?

27. Your friend drops a rubber ball from 4 ft. You notice that its rebound is 32.5 in. on the first bounce and 22 in. on the second bounce.
   a. What exponential function would be a good model for the height of the ball?
   b. How high will the ball bounce on the fourth bounce?

28. An investment of $75,000 increases at a rate of 12.5% per year. What is the value of the investment after 30 years?

29. A new truck that sells for $29,000 depreciates 12% each year. What is the value of the truck after 7 years?

30. The price of a new home is $350,000. The value of the home appreciates 2% each year. How much will the home be worth in 10 years?

31. The population of an endangered bird is decreasing at a rate of 0.75% per year. There are currently about 200,000 of these birds.
   a. What exponential function would be a good model for the population of these endangered birds?
   b. How many birds will there be in 100 years?