Exponential Applications

$y = a \cdot b^x$

a = starting value

b = growth factor

Percents:

7% increase: b = 1 + 0.07 = 1.07

7% decrease: b = 1 - 0.07 = 0.93

a

★ **EXTENDED RESPONSE** In 2000, the average price of a football ticket for a Minnesota Vikings game was $48.28. During the next 4 years, the price increased an average of 6% each year. $b = 1 + 0.06 = 1.06$

a. Write a model giving the average price p (in dollars) of a ticket t years after 2000. $y = 48.26(1.06)^x$

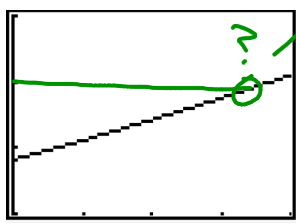
Use your calculator to make a graph, but set the window so that it shows the data for the relevant domain and range.

b. Graph the model. Estimate the year when the average price of a ticket was about $60.

c. *Explain* how you can use the graph of $p(t)$ to determine the minimum and maximum p-values over the domain for which the function gives meaningful results.

70

y = ticket cost



40

0 x = # years 4

?

$x = 3.73$ (Year 4)

$x: 0 \le x \le 4$

$y: 48.28 \le y \le 60.95$

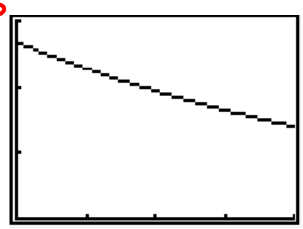
TV SALES From 1997 to 2001, the number n (in millions) of black-and-white TVs sold in the United States can be modeled by $n = 26.8(0.85)^t$ where t is the number of years since 1997. Identify the decay factor and the percent decrease. Graph the model and state the domain and range. Estimate the number of black-and-white TVs sold in 1999.

0.85 = "decay" factor

15% decrease

30

y = # TV's



0

0 4

x = # years

Set your window so that you see the graph for the relevant domain and range.

D: $0 \le x \le 4$

R: $0 \le y \le 30$

1999 = Year 2

$y = 26.8(.85)^2 = 19.36$ million TV's

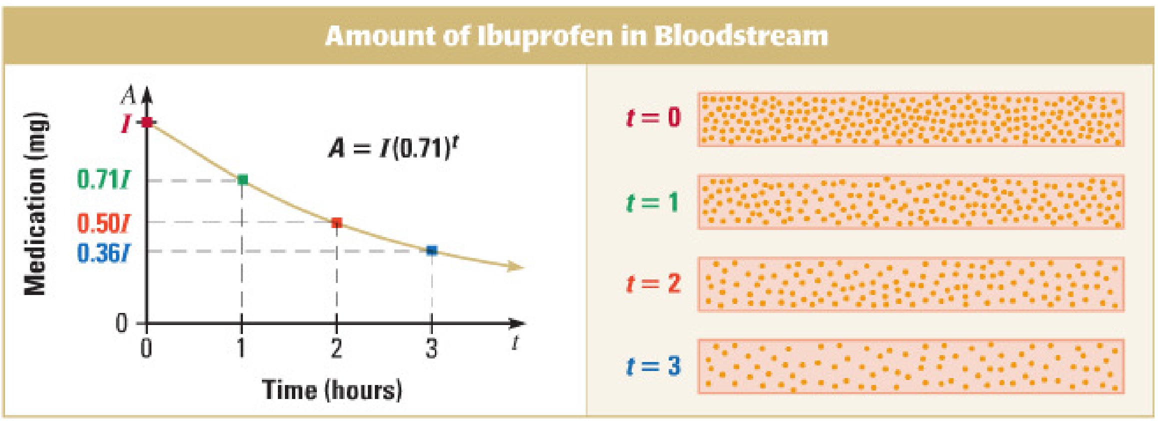
Exponential Applications

$g = 0.71$

71% remains

29% is used

MEDICINE When a person takes a dosage of I milligrams of ibuprofen, the amount A (in milligrams) of medication remaining in the person's bloodstream after t hours can be modeled by the equation $A = I(0.71)^t$.



Find the amount of ibuprofen remaining in a person's bloodstream for the given dosage and elapsed time since the medication was taken.

a. Dosage: 200 mg
Time: 1.5 hours

$A = 200(0.71)^{1.5}$

$= 119.65$ mg

b. Dosage: 325 mg
Time: 3.5 hours

$A = 325(0.71)^{3.5}$

$= 98.01$ mg

c. Dosage: 400 mg
Time: 5 hours

$A = 400(0.71)^5$

$= 72.17$ mg

Shown below is part of the handout that should go on p. 120.

Compound Interest

The compound interest formula for the amount A in an account after t years is $A = P(1 + \frac{r}{n})^{nt}$

where P is the principal, r is the annual interest rate as a decimal, and n is the number of times per year that interest is compounded.

Suppose a college savings account is paying 7% annual interest compounded n times per year. You will investigate how increasing n affect the value of $1000 invested in the account after 18 years.

Rewrite the formula for A to represent this problem.

$A = 1000\left(1 + \frac{.07}{n}\right)^{18n}$

Quarterly	4	$\left(1+\frac{.07}{4}\right)^{18\cdot 4}$	\$3487.21