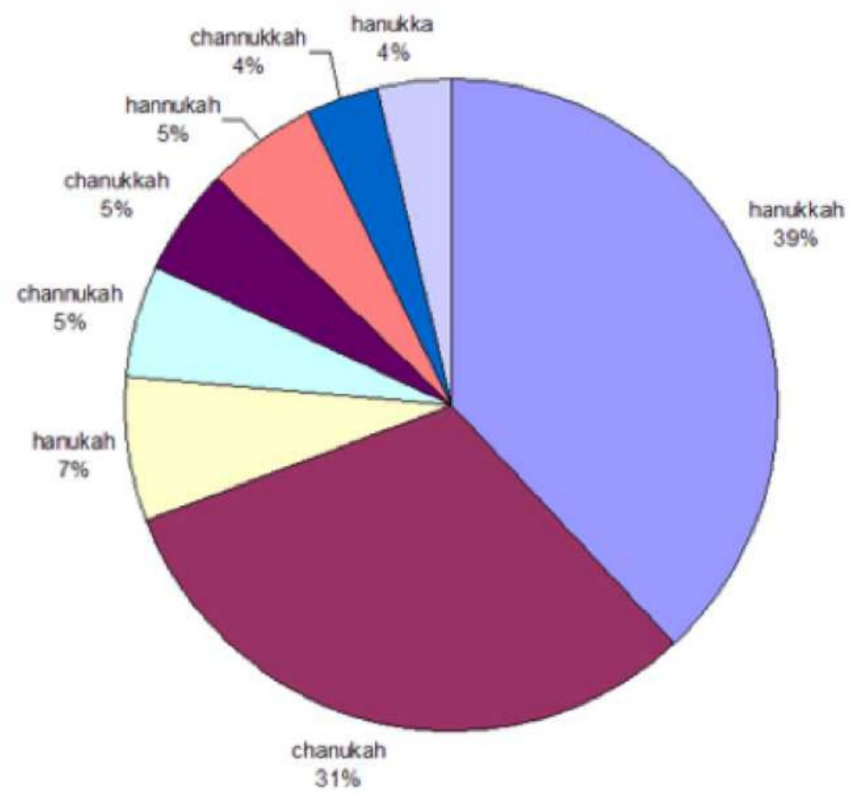


4.7 Exponential Word Problems - Day 2



HW:

*Exponential models WKST:
9, 11 - 16 all, 20*

Start Ch 4 Review (Test Wed.)

Growth/Decay Models

$$y = ab^x$$

$a \neq 0, \quad b > 0, \quad b \neq 1$

$b = 1 \pm r$

Where:

y ending amount
a initial amount
b growth/decay factor
x time

↓
r = rate
as a
decimal

Growth: $b > 1$

Decay: $0 < b < 1$

ex 1: From 1997 to 2002 the number n (in millions) of DVD players sold in the United States can be modeled by

$$n = 0.42(2.47)^t$$

a) Does this model represent a growth or decay model? Explain?

$$b = 2.47 > 1$$

ex 1: From 1997 to 2002 the number n (in millions) of DVD players sold in the United States can be modeled by

$$n = 0.42(2.47)^t$$

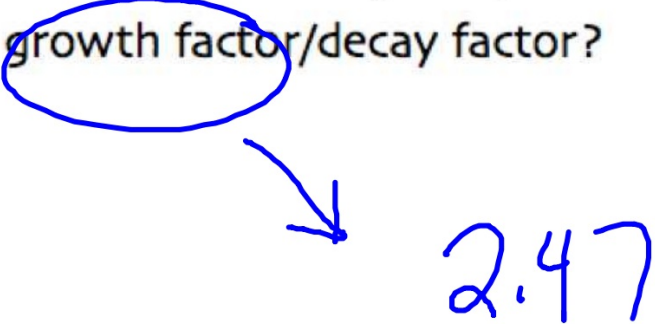
b) What is the initial amount?

.42 million
420,000 .

ex 1: From 1997 to 2002 the number n (in millions) of DVD players sold in the United States can be modeled by

$$n = 0.42(2.47)^t$$

c) What is the growth factor/decay factor?



2.47

ex 1: From 1997 to 2002 the number n (in millions) of DVD players sold in the United States can be modeled by

$$n = 0.42(2.47)^t$$

d) What is the annual percent of increase/decrease?

$$b = 1 + r$$

$$2.47 = 1 + r$$

$$1.47 = r$$

$$147\%$$

ex 2: A species of dolphins is decreasing at a rate of 3.1% per year. If there are currently 20,000 dolphins, how many will there be in 30 years? Round to the nearest dolphin.

$$y = ab^x$$
$$y = a(1-r)^x$$
$$y = 20000(1-.031)^{30}$$
$$7775.77$$
$$7776$$

ex 3: If you buy a new car for \$18,000 and cars depreciate at a rate of roughly 7% per year, how much could you sell it for in 3 years?

$$y = 18000(1 - .07)^3$$
$$y = \$14478.43$$

ex 4: If you bought a car 5 years ago for \$15,000 and today you can sell it for \$7,000, what was its rate of depreciation?

Write as a percent rounded to two decimal places.

$$y = a(1-r)^x$$

$$7000 = 15000(1-r)^5$$

$$\left(\frac{7}{15}\right)^{1/5} = \left((1-r)^5\right)^{1/5}$$

$$.8586207 = 1-r$$
$$r = .1414$$

14.14%

ex 5: Dinner at your grandfather's favorite restaurant now costs \$25.25 and has been increasing steadily at 4% per year. How much did it cost 35 years ago when he was courting your grandmother?

$$y = \$25.25$$

$$25.25 = a(1.04)^{35}$$

$$25.25 = 3.946...a$$

$$\$6.40 = a$$

$$D = 1 \pm r$$

$$D = 1 + .04$$

ex 6: If a gallon of milk costs \$3 now and the price is increasing 10% per year, how long before milk costs \$10 a gallon?

$$10 = 3(1.10)^x$$

$$\log \frac{10}{3} = \log 1.10^x$$

$$\frac{\log \frac{10}{3}}{\log 1.10} = \frac{x \log 1.10}{\log 1.10}$$

12.6
years

REVIEW

The domain of the function $f(x) = \log_4(5x+3) - 2$ over the set of real numbers is

- (A) $(-1.4, \infty)$ (B) $(-0.6, \infty)$ (C) $(-\infty, \infty)$ (D) $(-2.6, \infty)$ (E) $\left(-1\frac{2}{3}, \infty\right)$