Growth / Decay Word Problems cw/hw

Intro: 6% .06 0.01% .0001

100% + rate% = total rate of change
100% − rate% = total rate of change
(1 − r or 1 + r)

ex: pop inc. by a rate of 34%.

ROC: 1 + r
1 + .34 = 1.34

ex: each day you forget 1/3 of learned material

ROC: 1 − r
1 − 1/3 = .667

How do we write an equation?

$y = a \cdot b^x$
$y = a \cdot r^x$
$y = (\text{initial})(\text{rate})^{\text{time}}$

1. Read + underline what you're looking for!
2. Circle inc/dec
3. Write eqn if it's missing
4. Solve

Half-Life: how long it takes for half of material to decay

$A = A_0 (1/2)^{t/h}$

A: final amount; A_0: initial amount; t = time; h = half-life

Name:_____

1. The world population in 2000 was approximately 6.08 billion. The annual rate of increase was about 1.26%.

   initial

   1+r = .0126

   a. Find the growth factor for the world population.

   .0126

   b. Suppose the rate of increase continues to be 1.26% . Write a function to model the world population.

   $Y = 6.08(1.0126)^x$

   c. Let x be the number of years past the year 2000. Find the world population in 2010.

   $x = 10$ $y = 6.08(1.0126)^{10}$ $y = 6.89$ billion people

2. A computer valued at $6500 depreciates at the rate of 14.3% per year.

   initial 1-r .143

   a. Write a function that models the value of the computer.

   $Y = 6500(.857)^x$

   b. Find the value of the computer after three years.

   $Y = 6500(.857)^3$

   $Y = \$4091.25$

3. The population of a certain animal species decreases at a rate of 3.5% per year. You have counted 80 of the animals in the habitat you are studying.

   a. Write a function that models the change in the animal population.

   b. Graph the function. Estimate the number of years until the population fist drops below 15 animals

Exponential Growth and Decay Word Problems

Half-Life Problems

1. A hospital prepares a 100mg supply of technetium-99m which has a half-life of 6 hours.

initial = A_0

h = 6

a. What is the decay factor? $1 - 1/2 = 1/2$

b. What is the length of a half-life? 6 hours

c. Write an equation to represent this problem. $A = 100(1/2)^{t/6}$

d. Find the amount of technetium-99m that remains after 75 hours.

$A = 100(\frac{1}{2})^{75/6}$

$A = .0173$ mg

2. Arsenic-74 is used to locate brain tumors. It has a half-life of 17.5 days.

a. What is the decay factor?

e. What is the length of a half-life?

b. Write an equation to represent this problem.

c. Find the amount remaining after 6 days from a 90-mg sample.

3. Phosphorus-32 is used to study a plant's use of fertilizer. It has a half-life of 14.3 days. Write the exponential decay function for a 50-mg sample. Find the amount of phosporus-32 remaining after 84