Exponential Growth and Decay Word Problems

Name:_____Pd:_____Date:_____

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

    a. Find the growth factor for the world population.

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

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

2. A computer valued at $6500 depreciates at the rate of 14.3% per year.
    a. Write a function that models the value of the computer.

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

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

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4. Write an exponential function to model each situation. Find the value of each function after five years.

    a. A $12,500 car depreciates 9% each year

    b. A baseball card bought for $50 increases 3% in value each year.

5. A new car that sells for $18,000 depreciates 25% each year. Write a function that models the value of the car. Find the value of the car after 4 yr.

6. A new truck that sells for $29,000 depreciates 12% each year. Write a function that models the value of the truck. Find the value of the truck after 7 yr.

7. The bear population increases at a rate of 2% per year. There are 1573 bear this year. Write a function that models the bear population. How many bears will there be in 10 yr?

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8. An investment of $75,000 increases at a rate of 12.5% per year. Find the value of the investment after 30 yr.

9. 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. Write a function that models the bird population. How many birds will there be in 100 yr?

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Half-Life Problems

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

a. What is the decay factor?

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

c. Write an equation to represent this problem.

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

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 days.

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4. Iodine-131 is used to find leaks in water pipes. It has a half-life of 8.14 days. Write the exponential decay function for a 200-mg sample. Find the amount of Iodine-131 remaining after 72 days.

5. Carbon-14 is used to determine the age of artifacts in carbon dating. It has a half-life of 5730 years. Write the function for a 24-mg sample. Find the amount remaining after 30 millennia (1 millennium = 1,000 years)

6. Hg-197 is used in kidney scans. It has a half-life of 64.128 h. Write the exponential decay function for a 12-mg sample. Find the amount remaining after 72 h.

7. Sr-85 is used in bone scans. It has a half-life of 64.9 days. Write the exponential decay function for an 8-mg sample. Find the amount remaining after 100 days.

8. I-123 is used in thyroid scans. It has a half-life of 13.2 h. Write the exponential decay function for a 45-mg sample. Find the amount remaining after 5 h.

Exponential Growth/Decay

① a. 1.0126
b $f(x) = 6.08(1.0126)^x$
c. ≈6.89 billion

② a $f(x) = 6500(.857)^x$
b. ≈ $4091.25

SORRY!

③ a. $f(x) = 80(.965)^x$
b. ≈47 years

④ a. $f(x) = 12,500(.91)^x$
$f(5) \approx \$7800.40$
b. $f(x) = 50(1.03)^x$
$f(5) \approx \$57.96$

⑤ $f(x) = 18,000(.75)^x$
$f(4) \approx \$5695.31$

⑥ $f(x) = 29,000(.82)^x$
$f(7) \approx \$7229.28$

⑦ $f(x) = 1573(1.02)^x$
$f(10) \approx \$1,917.48$ bears

⑧ $f(x) = 75,000(1.125)^x$
$f(30) \approx \$9,568,247.87$

⑨ $f(x) = 200,000(.999925)^x$
$f(100) \approx 198,505.56$ birds