

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 first 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 phosphorus-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.