Name: Date: Period:

Show all of your work on a separate piece of paper.

1. A radioactive material decays according to the formula $A = A_0 10^{-kt}$ where A is the final amount, A_0 is the initial amount, and t is time in years. Find A, if A_0 = 500 grams, k = 0.0046, and t = 10 years. [Round the answer to the nearest hundredth of a gram.]

   (A) 449.75 (B) 44.97 (C) 0.68 (D) 555.87

2. Brandon works in a scientific laboratory where he observes that his bacteria culture doubles in size every 30 minutes. If there were 2,000 bacteria in the Petri dish at 10 a.m., how many will there be at 12 p.m.?

3. The growth of a colony of cells can be determined by the formula $G = I(3.1)^{0.226t}$, in which G represents the final number in the colony, I is the initial number of cells, and t represents elapsed time in hours. If a colony begins with 25 cells, find the size of the colony after 27 hours. [Round the answer to the nearest whole number.]

4. The value (V) of a savings account in which interest is compounded annually can be determined by the formula $V = C(1 + r)^t$, where C represents the amount of the initial deposit, r is the rate of interest, and t is the number of years for which the balance has been accruing interest. If $1,500 was deposited at 5% in 2001, find the value of the account, to the nearest dollar, after 15 years. [Assume that only interest is added to the account.]

5. A new boat will decrease in value at a rate of 8% per year according to this formula $V = C(1 – r)^t$ where V is the value of the boat after t years, C is the original cost, and r is the rate of depreciation. If a 10-year old boat is now worth $18,000, find the cost of the boat when it was new. [Round the answer to the nearest thousand dollars.]

6. A basketball is dropped from a height of 9 ft. Each time it bounces, it returns to a height 65%of its previous height. The height (h) may be determined by the formula $h = 9(.65)^n$ where n is the number of bounces. Find, to the nearest tenth of a foot, the height of the ball after 4 bounces.

7. An exponential model of a population growth is given by $P(t) = P_0 \bullet 10^{kt}$ where P_0 equals the original or initial population, k equals the constant 0.176, and t equals the number of years that have elapsed. If a population of a culture is 2,000 now, how large will the population be after 2 years? [Round your answer to the nearest integer.]

8. The amount of money A after t years that principal P will become if it is invested at a rate r and compounded n times a year is given by the relationship $A(t) = P(1 + \frac{r}{n})^{nt}$ where r is expressed as a decimal. To the nearest dollar, how much will $5,300 become if it is invested for 4.5 years at 9%, compounded quarterly?

9. The amount of money A after t years that principal P will become if it is invested at a rate r and compounded n times a year is given by the relationship $A(t) = P(1 + \frac{r}{n})^{nt}$ where r is expressed as a decimal. To the nearest dollar, how much will $3,600 become if it is invested for 4.2 years at 9%, compounded semi-annually?

10. A savings account, with an initial balance of P and an annual interest rate r, is compounded continuously for y years. The balance is given as $B = Pe^{ry}$ where $e \approx 2.718$. If the initial balance of an account is $1,200, find the balance in the account after 12.3 years at an annual interest rate of 8%. [Round the answer to the nearest dollar.]