Name_______________________________________ Date________________ Period_________

EXPONENTIAL MODELS WORKSHEET

1. Nuclear energy derived from radioactive isotopes can be used to supply power to space vehicles. Suppose that the output of the radioactive power supply for a certain satellite is given by the function:
$f(t) = 30e^{-0.003t}$, where $f(x)$ is measured in watts and t is time in days. What is the output of the power supply after 31 days?

2. An employee's salary is determined by the equation $S(x) = 45{,}500\ (1.03)^x$, where "x" is the years of experience of the employee. Find the salary of an employee with 12 years of experience.

3. The amount of particulate matter left in solution during a filtering process is given by the equation $P(x) = 400 \cdot 2^{-0.6x}$, where x is the number of filtering steps. Find the amounts left for 5 filtering steps (Round to the nearest whole number.)

4. The number of dislocated electric impulses per cubic inch in a transformer when lightning strikes is given by $D(x) = 8300 \cdot 4^x$, where x is the time in milliseconds of the lightning strike. Find the number of dislocated impulses at 6 milliseconds.

5. The amount of Carbon-14 in a living human is about 0.1 microCuries.
The amount remaining in a human body x years after death can be estimated by $A(x) = 0.1(0.5)^{\frac{x}{5730}}$.
How much is remaining in a human body 2000 years after death? Round your answer to three decimal places.

6. Growth of bacteria in food products causes a need to "time-date" some products (like milk) so that shoppers will buy the product and consume it before the number of bacteria grows too large and the product goes bad. Suppose that the formula $f(t) = 100e^{0.1t}$ represents the growth of bacteria in a food product, where "t" represents time in days and "f(t)" represents the number of bacteria in millions. If the product cannot be eaten after the bacteria count reaches 400,000,000, will it still be edible after 5 days?

7. Suppose that you are observing the behavior of cell duplication in a lab. In one experiment, you started with one cell and the cells doubled every minute. Write an equation to determine the amount (y) of cells after one "x" minutes.

8. A biologist is researching a newly-discovered species of bacteria. At time $t = 0$ hours, he puts one hundred bacteria into what he has determined to be a favorable growth medium. Six hours later, he measures 450 bacteria. Find an exponential equation that approximates the information. (Your base will not be a "nice" number!)

9. A $1,000 deposit is made at a bank that pays 12% compounded monthly. How much will you have in your account at the end of 10 years?

10. In 1995 the population of a certain city was 34,000. Since then, the population has been growing at the rate of 1% per year. Find a function f(x) that computes the population x years after 1995.