Exponential Growth and Decay Models

Directions: For each equation, identify the y-intercept and common ratio, state the percent growth or decay, and decide whether it represents growth or decay. For each context, let x represent the number of time periods since the situation begins. Write an exponential equation and answer the additional question. Show all work.

1. For $y = (400)(1.05^x)$, identify the y-intercept and common ratio. At what percentage is the function growing or decaying? Is it growth or decay?

2. For $y = (750)(0.8^x)$, identify the y-intercept and common ratio. At what percentage is the function growing or decaying? Is it growth or decay?

3. For $y = (120)(1.25^x)$, identify the y-intercept and common ratio. At what percentage is the function growing or decaying? Is it growth or decay?

4. For $y = (900)(0.6^x)$, identify the y-intercept and common ratio. At what percentage is the function growing or decaying? Is it growth or decay?

5. A population has 2400 organisms when an observation begins and increases by 10% each year. Write an exponential equation to model the population at any given time. What is the population after 2 years?

6. A machine is worth 20,000 dollars when it is purchased and decreases by 15% each year. Write an exponential equation to model its value at any given time. What is its value after 2 years?

7. A bacteria culture has 80 cells when an experiment starts and increases by 50% each hour. Write an exponential equation to model the number of bacteria cells at any given time. How many bacteria cells are present after 2 hours?

8. A medication contains 640 mg when treatment starts and decreases by 25% each hour. Write an exponential equation to model the amount of medication in the patient's system at any given time. How many milligrams remain after 2 hours?

9. A quantity is 100 when a process begins and increases by 20% each period. Write an exponential equation to model the quantity at any given time. What is the value after 2 periods?

10. A sample has 500 grams when an experiment starts and decreases by 20% each period. Write an exponential equation to model the amount of the sample at any given time. How many grams remain after 3 periods?

11. A game score is 64 points when a bonus stage begins and increases by 50% each level. Write an exponential equation to model the score at any given level. What is the score after 2 levels?

12. A machine is worth 1000 dollars when it is purchased and loses 50% of its value each year. Write an exponential equation to model its value at any given time. What is its value after 4 years?