Name: Date: Period:

Exponential Appreciation (Growth)	Exponential Depreciation (Decay)
$y = p(1 + r)^t$	$y = p(1 - r)^t$

p = Principal	**r = Rate**	**t = Time ****
(Initial Amount/y-intercept)	(% to be changed to a decimal)	(Usually in years, but depends on the context of the question)

Decide whether the function represents exponential growth or decay, then tell by what percent the function is increasing/decreasing.

			By What %				By What %
1.	$C(x) = 50(0.75)^x$	Growth or Decay		2.	$f(t) = 0.45(1.1)^t$	Growth or Decay	
3.	$B(x) = 250(1.012)^x$	Growth or Decay		4.	$y = 512(0.50)^n$	Growth or Decay	
5.	$n = 8(2)^x$	Growth or Decay		6.	$F(w) = 34(0.964)^w$	Growth or Decay	

Write an exponential function to model each situation.

1. Joe drank a cup of coffee that contained 120 mg of caffeine. The caffeine is eliminated from his body at a rate of 9% per hour. Write an exponential function to model the amount of caffeine remaining in Joe's system after x hours.

2. An online shopping service launched with 360 members. The number of members increased at a rate of 15% per month. Write a function to find the number of members after x months.

3. A laptop loses 40% of its resale value each year. Write a function that can be used to determine the value of a laptop after x years if it is currently valued at $1,500.

4. A population of 542 pandas is released in a wildlife preserve. The population grows at a rate of 2.5% each year. Write a function that can be used to find the number of pandas in the preserve after x years.

5. In 1960, stamps sold for $0.05. The price of stamps increases about 4.5% per year. Write a function that can be used to find the price of a stamp x years after 1960.

6. A radioactive element decays at a rate of 5% annually. There are 45 grams of the substance presently. Write an equation to find the amount remaining after x years.

7. A viral video has 450 views. The number of views grows 95% each hour. Write a function to find the number of views the video will have after x hours.

8. Bob's Gym had 550 members the year it opened. Membership increased at a rate of 10% per year. Write a function to model the number of members of Bob's Gym x years after it opened.

9. The population of a certain animal species declines at a rate of 55% per year. If there are 95 of these animals in a habitat, write a function to show the number of animals in the habitat after x years.

10. A pie is 325° F when it is taken out of the oven and put on a windowsill to cool. The temperature of the pie decreases 7% per minute. Write a function to determine the temperature of the pie after x minutes.

Model Problem: Determine if the interpretation is correct, then justify your answer.

An entrepreneur used the function, $y = 256(1.25)^x$ to model the number of employees working for her company x years after it was founded. **Interpretation:** After one year, her company had 256 employees.	True or False	**Justify**: 256 is the number of employees when the company was founded. $y = 256(1.25)^x$ $y = 256(1.25)^1$ $y = 320$ After one year, the company had 320 employees

Determine if each interpretation is correct, then justify your answer.

1. The function, $y = 400(0.72)^h$ models the amount of ibuprofen in a patient's system after h hours. **Interpretation:** Each hour, the amount of ibuprofen in the patient's system decreases by 28%.	True or False	**Justify**:
2. The volume of air in a balloon x day safter it is inflated can be modeled by the function, $y = 904(0.86)^x$. **Interpretation:** The volume of the air in the balloon decreases 86% each day.	True or False	**Justify**:
3. The function, $y = 834(1.1)^x$ gives the number of bald eagles x years after they were added to the endangered species list. **Interpretation:** The number of bald eagles increases by 11% each year.	True or False	**Justify**:

1. Due to a drought, a lake's depth has been decreasing at a rate of 2.8% per week. Before the drought, the depth of the lake was 55 meters. Which function can be used to find the depth of the lake d weeks after the drought began?

   [a] $l(d) = 0.972(55)^d$ [b] $l(d) = 1.028(55)^d$ [c] $l(d) = 55(0.972)^d$ [d] $l(d) = 55(1.028)^d$

2. In the year 2010, the world population was approximately 7.05 billion. Each year since 2010, the world population increased by about 1.15%. Which function models the world population in billions x years after the year 2010?

   [a] $p(x) = 1.15(7.05)^x$ [b] $p(x) = 1.15(1.0705)^x$ [c] $p(x) = 7.05(1.015)^x$ [d] $p(x) = 7.5(1.0705)^x$

3. Sandra used the function $m(x) = 3500(0.85)^x$ to show the value of her road bike x years after she bought it. What does the 3500 represent?

   [a] The value of Sandra's road bike after one year.
   [b] The rate of depreciation of Sandra's road bike.
   [c] The value of Sandra's road bike the year she bought it.
   [d] The number of miles Sandra has ridden her road bike since she bought it.

4. Sam used the function $c(x) = 65(0.75)^x$ to model the balance in his savings account x days after he deposited his birthday money. Which statement is the best interpretation of one of the values in this function?

   [a] Sam's account balance decreases at a rate of 75% each day.
   [b] Sam's account balance increases at a rate of 25% each day.
   [c] The amount in Sam's account after one day is $65.
   [d] Sam deposited $65 into his savings account.