

F.LE.B.5: Modeling Exponential Functions 1

- 1 Mike uses the equation $b = 1300(2.65)^x$ to determine the growth of bacteria in a laboratory setting. The exponent represents
 - 1) the total number of bacteria currently present
 - 2) the percent at which the bacteria are growing
 - 3) the initial amount of bacteria
 - 4) the number of time periods

- 2 Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation $y = 5000(0.98)^x$ represents the value, y , of one account that was left inactive for a period of x years. What is the y -intercept of this equation and what does it represent?
 - 1) 0.98, the percent of money in the account initially
 - 2) 0.98, the percent of money in the account after x years
 - 3) 5000, the amount of money in the account initially
 - 4) 5000, the amount of money in the account after x years

- 3 The function $V(t) = 1350(1.017)^t$ represents the value $V(t)$, in dollars, of a comic book t years after its purchase. The yearly rate of appreciation of the comic book is
 - 1) 17%
 - 2) 1.7%
 - 3) 1.017%
 - 4) 0.017%

- 4 The equation $A = 1300(1.02)^7$ is being used to calculate the amount of money in a savings account. What does 1.02 represent in this equation?
 - 1) 0.02% decay
 - 2) 0.02% growth
 - 3) 2% decay
 - 4) 2% growth

- 5 A population of bacteria can be modeled by the function $f(t) = 1000(0.98)^t$, where t represents the time since the population started decaying, and $f(t)$ represents the population of the remaining bacteria at time t . What is the rate of decay for this population?
 - 1) 98%
 - 2) 2%
 - 3) 0.98%
 - 4) 0.02%

- 6 Jim uses the equation $A = P(1 + 0.05)^t$ to find the amount of money in an account, A , of an investment, P , after t years. For this equation, which phrase describes the yearly rate of change?
 - 1) decreasing by 5%
 - 2) decreasing by 0.05%
 - 3) increasing by 5%
 - 4) increasing by 0.05%

- 7 Milton has his money invested in a stock portfolio. The value, $v(x)$, of his portfolio can be modeled with the function $v(x) = 30,000(0.78)^x$, where x is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?
 - 1) It decreases 78% per year.
 - 2) It decreases 22% per year.
 - 3) It increases 78% per year.
 - 4) It increases 22% per year.

- 8 Is the equation $A = 21000(1 - 0.12)^t$ a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?
 - 1) exponential growth and 12%
 - 2) exponential growth and 88%
 - 3) exponential decay and 12%
 - 4) exponential decay and 88%

- 9 In the equation $A = P(1 \pm r)^t$, A is the total amount, P is the principal amount, r is the annual interest rate, and t is the time in years. Which statement correctly relates information regarding the annual interest rate for each given equation?
- 1) For $A = P(1.025)^t$, the principal amount of money is increasing at a 25% interest rate.
 - 2) For $A = P(1.0052)^t$, the principal amount of money is increasing at a 52% interest rate.
 - 3) For $A = P(0.86)^t$, the principal amount of money is decreasing at a 14% interest rate.
 - 4) For $A = P(0.68)^t$, the principal amount of money is decreasing at a 68% interest rate.
- 10 The equation $V(t) = 12,000(0.75)^t$ represents the value of a motorcycle t years after it was purchased. Which statement is true?
- 1) The motorcycle cost \$9000 when purchased.
 - 2) The motorcycle cost \$12,000 when purchased.
 - 3) The motorcycle's value is decreasing at a rate of 75% each year.
 - 4) The motorcycle's value is decreasing at a rate of 0.25% each year.
- 11 The 2014 winner of the Boston Marathon runs as many as 120 miles per week. During the last few weeks of his training for an event, his mileage can be modeled by $M(w) = 120(.90)^{w-1}$, where w represents the number of weeks since training began. Which statement is true about the model $M(w)$?
- 1) The number of miles he runs will increase by 90% each week.
 - 2) The number of miles he runs will be 10% of the previous week.
 - 3) $M(w)$ represents the total mileage run in a given week.
 - 4) w represents the number of weeks left until his marathon.
- 12 The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered. What is the percent of change each year? Explain how you arrived at your answer.
- 13 The value, $v(t)$, of a car depreciates according to the function $v(t) = P(.85)^t$, where P is the purchase price of the car and t is the time, in years, since the car was purchased. State the percent that the value of the car *decreases* by each year. Justify your answer.
- 14 The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

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Answer Section

- 1 ANS: 4 REF: 062308ai
2 ANS: 3 REF: 011515ai
3 ANS: 2 REF: 061517ai
4 ANS: 4 REF: 011608ai
5 ANS: 2 REF: 061923ai
6 ANS: 3 REF: 082312ai
7 ANS: 2 REF: 081624ai
8 ANS: 3 REF: 081211ia
9 ANS: 3 REF: 062221ai
10 ANS: 2 REF: 012014ai
11 ANS: 3 REF: 011724ai
12 ANS:

$1 - 0.95 = 0.05 = 5%$ To find the rate of change of an equation in the form $y = ab^x$, subtract b from 1.

REF: 081530ai

- 13 ANS:

$1 - 0.85 = 0.15 = 15%$ To find the rate of change of an equation in the form $y = ab^x$, subtract b from 1.

REF: 061728ai

- 14 ANS:

0.5 represents the rate of decay and 300 represents the initial amount of the compound.

REF: 061426ai