Exponential Growth/Decay Word Problems

Name: _____ **Date:** _____

1. Adrianne invested $2000 in an account at a 3.5% interest rate compounded annually. She made no deposits or withdrawals on the account for 4 years. Determine, to the *nearest dollar*, the balance in the account after the 4 years.

2. Dylan invested $600 in a savings account at a 1.6% annual interest rate. He made no deposits or withdrawals on the account for 2 years. The interest was compounded annually. Find, to the *nearest cent*, the balance in the account after 2 years.

3. Kirsten invested $1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

4. The formula for exponential decay is $y = a(1 - r)^t$, where a is the initial amount, r is the rate of decay and t is the number of intervals. Use the formula to determine the answer to the following problem.

   On Wednesday, your science teacher gives you a list of twenty-five terms to be memorized. You memorize all of them Wednesday night and do not look at the list again. If you forget 5% of the list each day, how many terms will you remember seven days later for the chapter test?

5. In 2012, there were 1,238 students at Baker High School. If the the number of students at the high school increases at a rate of 3.5% per year, how many students can Baker expect to have in the year 2020?

6. The value in dollars, $v(x)$, of a certain car after x years is represented by the equation $v(x) = 25,000(0.86)^x$. To the *nearest dollar*, how much more is the car worth after 2 years than after 3 years?

   A. 2589 B. 6510 C. 15,901 D. 18,490

7. Mr. Smith invested $2,500 in a savings account that earns 3% interest compounded annually. He made no additional deposits or withdrawals. Which expression can be used to determine the number of dollars in this account at the end of 4 years?

   A. $2500(1 + 0.03)^4$ B. $2500(1 + 0.3)^4$

   C. $2500(1 + 0.04)^3$ D. $2500(1 + 0.4)^3$

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?

   A. exponential growth and 12%

   B. exponential growth and 88%

   C. exponential decay and 12%

   D. exponential decay and 88%

9. 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.

10. Krystal was given $3000 when she turned 2 years old. Her parents invested it at a 2% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Krystal had in the account when she turned 18?

A. $3000(1 + 0.02)^{16}$ B. $3000(1 - 0.02)^{16}$

C. $3000(1 + 0.02)^{18}$ D. $3000(1 - 0.02)^{18}$

11. 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?

A. 0.98, the percent of money in the account initially

B. 0.98, the percent of money in the account after x years

C. 5000, the amount of money in the account initially

D. 5000, the amount of money in the account after x years

12. 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

A. 17% B. 1.7% C. 1.017% D. 0.017%

13. The country of Benin in West Africa has a population of 9.05 million people. The population is growing at a rate of 3.1% each year. Which function can be used to find the population 7 years from now?

A. $f(t) = (9.05 \times 10^6)(1 - 0.31)^7$

B. $f(t) = (9.05 \times 10^6)(1 + 0.31)^7$

C. $f(t) = (9.05 \times 10^6)(1 + 0.031)^7$

D. $f(t) = (9.05 \times 10^6)(1 - 0.031)^7$

14. For a recently released movie, the function $y = 119.67(0.61)^x$ models the revenue earned, y, in millions of dollars each week, x, for several weeks after its release.

Based on the equation, how much more money, in millions of dollars, was earned in revenue for week 3 than for week 5?

A. 37.27 B. 27.16 C. 17.06 D. 10.11

15. 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?

A. 0.02% decay B. 0.02% growth

C. 2% decay D. 2% growth

16. 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?

A. It decreases 78% per year.

B. It decreases 22% per year.

C. It increases 78% per year.

D. It increases 22% per year.

17. A student invests $500 for 3 years in a savings account that earns 4% interest per year. No further deposits or withdrawals are made during this time. Which statement does *not* yield the correct balance in the account at the end of 3 years?

A. $500(1.04)^3$

B. $500(1 - .04)^3$

C. $500(1 + .04)(1 + .04)(1 + .04)$

D. $500 + 500(.04) + 520(.04) + 540.8(.04)$

18. 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.

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1.
Answer: 2295

2.
Answer: 619.35

3.
Answer: 1159.27 and correct work is shown.

4.
Answer:
Objective: F.IF.08B

5.
Answer:
Objective: F.IF.08B

6.
Answer: A

7.
Answer: A

8.
Answer: C

9.
Answer: 0.5 is the rate of decay and 300 is the initial amount.

10.
Answer: A

11.
Answer: C

12.
Answer: B

13.
Answer: C

14.
Answer: C

15.
Answer: D

16.
Answer: B

17.
Answer: B

18.
Answer: 5