

A.A.9: Analyze and solve verbal problems that involve exponential growth and decay.

1. fall9916b, P.I. A.A.9

The population of Henderson City was 3,381,000 in 1994, and is growing at an annual rate of 1.8%. If this growth rate continues, what will the approximate population of Henderson City be in the year 2000?

- [A] 3,798,000 [B] 3,831,000
[C] 3,763,000 [D] 3,696,000

2. 080929ia, P.I. A.A.9

Cassandra bought an antique dresser for \$500. If the value of her dresser increases 6% annually, what will be the value of Cassandra's dresser at the end of 3 years to the *nearest dollar*?

- [A] \$596 [B] \$415
[C] \$590 [D] \$770

3. 010525b, P.I. A.A.9

On January 1, 1999, the price of gasoline was \$1.39 per gallon. If the price of gasoline increased by 0.5% per month, what was the cost of one gallon of gasoline, to the *nearest cent*, on January 1 one year later?

4. 060935ia, P.I. A.A.9

A bank is advertising that new customers can open a savings account with a $3\frac{3}{4}\%$ interest rate compounded annually. Robert invests \$5,000 in an account at this rate. If he makes no additional deposits or withdrawals on his account, find the amount of money he will have, to the *nearest cent*, after three years.

5. 060803b, P.I. A.A.9

Kathy deposits \$25 into an investment account with an annual rate of 5%, compounded annually. The amount in her account can be determined by the formula $A = P(1 + R)^t$, where P is the amount deposited, R is the annual interest rate, and t is the number of years the money is invested. If she makes no other deposits or withdrawals, how much money will be in her account at the end of 15 years?

- [A] \$393.97 [B] \$43.75
[C] \$25.75 [D] \$51.97

6. 080224b, P.I. A.A.9

The Franklins inherited \$3,500, which they want to invest for their child's future college expenses. If they invest it at 8.25% with interest compounded monthly, determine the value of the account, in dollars, after 5 years.

Use the formula $A = P(1 + \frac{r}{n})^n$, where A = value of the investment after t years, P = principal invested, r = annual interest rate, and n = number of times compounded per year.

7. 010908ia, P.I. A.A.9

The New York Volleyball Association invited 64 teams to compete in a tournament. After each round, half of the teams were eliminated. Which equation represents the number of teams, t , that remained in the tournament after r rounds?

[A] $t = 64(1.5)^r$

[B] $t = 64(0.5)^r$

[C] $t = 64(r)^{0.5}$

[D] $t = 64(-0.5)^r$

8. 010813b, P.I. A.A.9

A radioactive substance has an initial mass of 100 grams and its mass halves every 4 years. Which expression shows the number of grams remaining after t years?

[A] $100\left(\frac{1}{2}\right)^{4t}$

[B] $100(4)^{-2t}$

[C] $100(4)^{\frac{t}{4}}$

[D] $100\left(\frac{1}{2}\right)^{\frac{t}{4}}$

9. 060830ia, P.I. A.A.9

Kathy plans to purchase a car that depreciates (loses value) at a rate of 14% per year. The initial cost of the car is \$21,000. Which equation represents the value, v , of the car after 3 years?

[A] $v = 21,000(0.14)^3$

[B] $v = 21,000(1.14)^3$

[C] $v = 21,000(0.86)(3)$

[D] $v = 21,000(0.86)^3$

10. fall0719ia, P.I. A.A.9

Daniel's Print Shop purchased a new printer for \$35,000. Each year it depreciates (loses value) at a rate of 5%. What will its approximate value be at the end of the fourth year?

[A] \$28,507.72

[B] \$33,250.00

[C] \$27,082.33

[D] \$30,008.13

11. 080221b, P.I. A.A.9

A used car was purchased in July 1999 for \$11,900. If the car depreciates 13% of its value each year, what is the value of the car, to the *nearest hundred dollars*, in July 2002?

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[1] C _____

[2] A _____

[2] \$1.48, and appropriate work is shown, such as providing a correctly labeled table or solving the equation $(1.39)(1.005)^{12} = C$.

[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as using 1.05 or 1.5 or using an incorrect exponent.
or [1] A correct equation is written, but no further correct work is shown.

or [1] An incorrect equation of equal difficulty is solved appropriately.

or [1] \$1.48, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[3] incorrect procedure. _____

[3] 5,583.86, and appropriate work is shown.

[2] Appropriate work is shown, but one computational or rounding error is made.

[1] Appropriate work is shown, but two or more computational or rounding errors are made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] $A = 5000(1 + 0.0375)^3$ or an equivalent equation, but no further correct work is shown.

or [1] 5,583.86, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure. _____

[5] D _____

[2] 5,279.61, and appropriate work is shown, such as $3,500(1 + \frac{0.0825}{12})^{(12 \times 5)}$.

[1] Appropriate work is shown, but one computational or substitution error is made.
or [1] 5,279.61, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure. _____

[7] B _____

[8] D _____

[9] D _____

[10] A _____

[2] 7,800, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] 7,800, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure. _____

[11]