

Lesson 8-8: Exponential Growth and Decay

Part 1: Exponential Growth

1. 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?
2. 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.

Part 2: Exponential Decay

3. 010813b
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] $100(\frac{1}{2})^{\frac{t}{4}}$ [B] $100(\frac{1}{2})^{4t}$
[C] $100(4)^{\frac{t}{4}}$ [D] $100(4)^{-2t}$

4. 060607b, P.I. A.A.9
The height, $f(x)$, of a bouncing ball after x bounces is represented by $f(x) = 80(0.5)^x$. How many times higher is the first bounce than the fourth bounce?
[A] 2 [B] 4 [C] 8 [D] 16
5. 060721b, P.I. A.A.9
A population of wolves in a county is represented by the equation $P(t) = 80(0.98)^t$, where t is the number of years since 1998. Predict the number of wolves in the population in the year 2008.
6. 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?
7. 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] \$27,082.33 [B] \$33,250.00
[C] \$28,507.72 [D] \$30,008.13

[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

[1] incorrect procedure.

[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

[2] incorrect procedure.

[3] A

[4] C

[2] 65, and appropriate work is shown, such as $P(10) = 80(0.98)^{10}$.

[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.

or [1] 65, 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

[5] incorrect procedure.

[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

[6] incorrect procedure.

[7] C