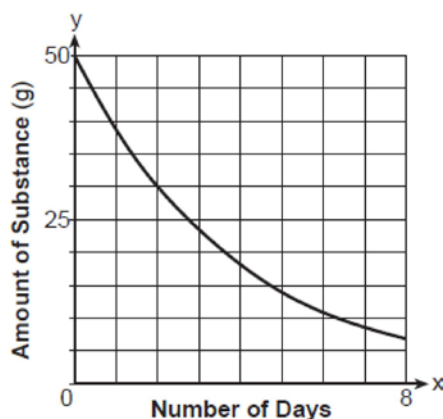


F.LE.B.5: Modeling Exponential Functions 2

- 1 The graph below shows the amount of a radioactive substance left over time.



The daily rate of decay over an 8-day interval is approximately

- 1) 23%
 - 2) 95%
 - 3) 5%
 - 4) 77%
- 2 The value of an automobile t years after it was purchased is given by the function $V = 38,000(0.84)^t$. Which statement is true?
- 1) The value of the car increases 84% each year.
 - 2) The value of the car decreases 84% each year.
 - 3) The value of the car increases 16% each year.
 - 4) The value of the car decreases 16% each year.

- 3 A certain pain reliever is taken in 220 mg dosages and has a half-life of 12 hours. The function

$$A = 220\left(\frac{1}{2}\right)^{\frac{t}{12}}$$

can be used to model this situation, where A is the amount of pain reliever in milligrams remaining in the body after t hours. According to this function, which statement is true?

- 1) Every hour, the amount of pain reliever remaining is cut in half.
 - 2) In 12 hours, there is no pain reliever remaining in the body.
 - 3) In 24 hours, there is no pain reliever remaining in the body.
 - 4) In 12 hours, 110 mg of pain reliever is remaining.
- 4 The amount of a substance, $A(t)$, in grams, remaining after t days is modeled by

$$A(t) = 50(0.5)^{\frac{t}{3}}$$

. Which statement is false?

- 1) In 20 days, there is no substance remaining.
- 2) After two half-lives, there is 25% of the substance remaining.
- 3) The amount of the substance remaining can also be modeled by

$$A(t) = 50(2)^{\frac{-t}{3}}$$

- 4) After one week, there is less than 10g of the substance remaining.

- 5 An equation to represent the value of a car after t months of ownership is $v = 32,000(0.81)^{\frac{t}{12}}$. Which statement is *not* correct?

- 1) The car lost approximately 19% of its value each month.
- 2) The car maintained approximately 98% of its value each month.
- 3) The value of the car when it was purchased was \$32,000.
- 4) The value of the car 1 year after it was purchased was \$25,920.

- 6 If $f(t) = 50(.5)^{\frac{t}{5715}}$ represents a mass, in grams, of carbon-14 remaining after t years, which statement(s) must be true?

I. The mass of the carbon-14 is decreasing by half each year.

II. The mass of the original sample is 50 g.

- 1) I, only
- 2) II, only
- 3) I and II
- 4) neither I nor II

- 7 The function $p(t) = 110e^{0.03922t}$ models the population of a city, in millions, t years after 2010. As of today, consider the following two statements:

I. The current population is 110 million.

II. The population increases continuously by approximately 3.9% per year.

This model supports

- 1) I, only
- 2) II, only
- 3) both I and II
- 4) neither I nor II

- 8 A savings account, S , has an initial value of \$50. The account grows at a 2% interest rate compounded n times per year, t , according to the function below.

$$S(t) = 50 \left(1 + \frac{.02}{n} \right)^{nt}$$

Which statement about the account is correct?

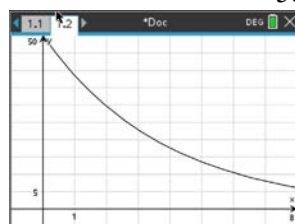
- 1) As the value of n increases, the amount of interest per year decreases.
- 2) As the value of n increases, the value of the account approaches the function $S(t) = 50e^{0.02t}$.
- 3) As the value of n decreases to one, the amount of interest per year increases.
- 4) As the value of n decreases to one, the value of the account approaches the function $S(t) = 50(1 - 0.02)^t$.

F.LE.B.5: Modeling Exponential Functions 2

Answer Section

1 ANS: 1

Estimate (0,50) and (1,38) as points on the graph. $\frac{38}{50} = 76\%$ implies an estimated 24% rate of decay. Confirmed



with graph of $y = 50(.77)^x$:

REF: 012516aaii

2 ANS: 4 REF: 012303aaii

3 ANS: 4 REF: 011805aaii

4 ANS: 1

1) $A(20) > 0$; 2) $.5 \times .5 = .25$; 3) true; 4) $A(7) \approx 9.9$

REF: 082211aaii

5 ANS: 1

The car lost approximately 19% of its value each year.

REF: 081613aaii

6 ANS: 2

The mass of the carbon-14 is decreasing by half every 5715 years.

REF: 011805aaii

7 ANS: 2

The 2010 population is 110 million.

REF: 061718aaii

8 ANS: 2

REF: 061917aaii