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Algebra II



Converting Rates

Round all coefficients to 6 decimal places

1. Gerard took out a \$72000 loan for college that has a 12.7% interest rate. An equation to represent this situation is given as $A(t) = 72000(1.127)^t$.

Write an equation to find the monthly growth rate after t years.

$$A = 72000(1.010013)^{12t}$$

$$1.127^{\frac{1}{12}}$$
$$1.010013$$

Write an equation to find the monthly growth rate after m months.

$$A = 72000(1.010013)^m$$

Write an equation to find the weekly growth rate after t years.

$$A = 72000(1.002302)^{52t}$$

$$1.127^{\frac{1}{52}}$$
$$1.002302$$

Write an equation to find the weekly growth rate after w weeks.

$$A = 72000(1.002302)^w$$

2. The population of a small neighborhood in Brooklyn, NY is 452,000 and is growing by a rate of 11.6% each year. An equation to represent this situation is given as $A(t) = 452000(1.116)^t$.

Write an equation to find the monthly growth rate after t years.

$$A = 452000(1.009188)^{12t}$$

$$1.116^{\frac{1}{12}}$$
$$1.009188$$

Write an equation to find the monthly growth rate after m months.

$$A = 452000(1.009188)^m$$

Write an equation to find the weekly growth rate after t years.

$$A = 452000(1.002113)^{52t}$$

$$1.116^{\frac{1}{52}}$$
$$1.002113$$

Write an equation to find the weekly growth rate after w weeks.

$$A = 452000(1.002113)^w$$

3. Stephanie found that the number of white-winged cross bills in an area can be represented by the formula $C = 550(1.08)^t$, where t represents the number of years since 2010. Which equation correctly represents the number of white-winged cross bills in terms of the monthly rate of population growth?

1) $C = 550(1.00643)^t$

2) $C = 550(1.00643)^{12t}$

3) ~~$C = 550(1.08)^{12t}$~~

4) $C = 550(1.00643)^{\frac{t}{12}}$

$1.08^{\frac{1}{12}}$

1.00643

4. The value of a stock after t years can be modeled by the function $V = 2500(1.14)^t$ after t years. Which function would represent the weekly rate of increase after w weeks?

1) $V = 2500(1.14)^w$

2) ~~$V = 2500(1.14)^{52w}$~~

3) $V = 2500(1.0025)^w$

4) $V = 2500(1.0025)^{52w}$

$1.14^{\frac{1}{52}}$

1.0025

5. The value of a home after t years can be modeled by the function $A = 525000(1.36)^t$ after t years. Which function would represent the monthly rate of increase after m months?

2) $A = 525000(1.36)^m$

2) $A = 525000(1.36)^{12m}$

3) $A = 525000(1.026)^m$

4) $A = 525000(1.026)^{12m}$

$1.36^{\frac{1}{12}}$

1.026

6. A study of the annual population of the red-winged blackbird in Ft. Mill, South Carolina, shows the population, $B(t)$, can be represented by the function $B(t) = 750(1.16)^t$, where the t represents the number of years since the study began. In terms of the monthly rate of growth, the population of red-winged blackbirds can be best approximated by the function

1) $B(t) = 750(1.012)^t$

2) ~~$B(t) = 750(1.16)^{12t}$~~

3) $B(t) = 750(1.012)^{12t}$

4) ~~$B(t) = 750(1.16)^{\frac{t}{12}}$~~

$1.16^{\frac{1}{12}}$

1.012

7. Mia has a student loan that is in deferment, meaning that she does not need to make payments right now. The balance of her loan account during her deferment can be represented by the function $f(x) = 35,000(1.0325)^x$, where x is the number of years since the deferment began. If the bank decides to calculate her balance showing a monthly growth rate, an approximately equivalent function would be

1) $f(x) = 35,000(1.0027)^{12x}$

2) $f(x) = 35,000(1.0027)^{\frac{x}{12}}$

3) $f(x) = 35,000(1.0325)^{12x}$

4) $f(x) = 35,000(1.0325)^{\frac{x}{12}}$

$1.0325^{\frac{1}{12}}$

1.0027

8. The value of Kiara's stock can be modeled by $A = 2500(1.016)^m$ where m represents the number of months her stock has been invested. Which equation would represent the yearly growth rate of her stock after y years?

- 1) $A = 2500(1.0013)^y$ 3) $A = 2500(1.0013)^{\frac{y}{12}}$
 2) $A = 2500(1.2098)^y$ 4) $A = 2500(1.2098)^{\frac{y}{12}}$
- 1.016^{12}
 1.2098

9. The value of Kiara's stock can be modeled by $A = 2500(1.016)^m$ where m represents the number of months her stock has been invested. Which equation would represent the yearly growth rate of her stock after m months?

- 1) $A = 2500(1.0013)^m$ 3) $A = 2500(1.2098)^{12m}$
 2) $A = 2500(1.2098)^m$ 4) $A = 2500(1.2098)^{\frac{m}{12}}$
- 1.016^{12}
 1.2098

10. Nvidia stock has been increasing by 1.7% each day according to the formula $v(t) = 1000(1.017)^t$ where t represents days. Which of the following equations can be used to find the weekly growth rate after w weeks?

- 1) $v(w) = 1000(1.0024)^w$ 3) $v(w) = 1000(1.0024)^{\frac{w}{7}}$
 2) $v(w) = 1000(1.1252)^w$ 4) $v(w) = 1000(1.1252)^{7w}$
- 1.017^7
 1.1252

11. Rose's bank account has been increasing according to the equation $A = 7500(1.0098)^w$ where w represents weeks. Which of the following equations can be used to find the yearly growth rate after w weeks?

- 1) $A = 7500(1.0002)^{52w}$ 3) $A = 7500(1.6605)^{\frac{w}{52}}$
 2) $A = 7500(1.0002)^{\frac{w}{52}}$ 4) $A = 7500(1.6605)^w$
- 1.0098^{52}
 1.6605

12. The population of Schlansky, Utah is increasing according to the formula $p(t) = 10421(1.23)^t$ after t years. Which expression can represent the weekly growth rate, after w weeks?

- 1) $10421(1.23)^{52w}$ 3) $10421(1.23)^w$
 2) $10421(1.004)^{52w}$ 4) $10421(1.004)^w$
- $1.23^{\frac{1}{52}}$
 1.004

13. To prepare for lacrosse tryouts, Kole is increasing the amount of time he spends at the gym. This week he is spending 150 minutes there and he plans to increase this amount by 2% each week. The amount of time, in minutes, that he plans to spend at the gym t weeks from now is given by the function $A(t) = 150(1.02)^t$. In terms of a daily growth rate, the amount of time Kole is planning to spend at the gym can best be modeled by the function

- 1) $A(t) = 150(1.14869)^{\frac{t}{7}}$ 3) $A(t) = 150(1.00283)^{\frac{t}{7}}$
 2) $A(t) = 150(1.14869)^{7t}$ 4) $A(t) = 150(1.00283)^{7t}$
- $1.02^{\frac{1}{7}}$
 1.00283

14. Cameron's YouTube video currently has 1200 views and can be modeled by the expression $1200(1.102)^d$ where d represents days. Which expression represents the weekly rate after t weeks.

1) $1200(1.9737)^t$
 2) $1200(1.9737)^{\frac{t}{7}}$

3) ~~$1200(1.0140)^t$~~
 4) $1200(1.0140)^{\frac{t}{7}}$

1.102^7
 1.9737

15. The number of people who have read an article grows exponentially throughout the day and can be modeled by the function $N(t) = 2(1.0098)^t$, where t represents the number of minutes since the article has been posted. Which equation best represents the number of people who have read the article in terms of the growth rate per second?

1) $N(t) = 2(1.000163)^{\frac{t}{60}}$
 2) $N(t) = 2(1.000163)^{60t}$

3) ~~$N(t) = 2(1.79524)^{\frac{t}{60}}$~~
 4) ~~$N(t) = 2(1.79524)^{60t}$~~

$1.0098^{\frac{1}{60}}$
 1.000163

16. A student studying public policy created a model for the population of Detroit, where the population decreased 25% over a decade. He used the model $P = 714(0.75)^d$, where P is the population, in thousands, d decades after 2010. Another student, Suzanne, wants to use a model that would predict the population after y years. Suzanne's model is best represented by

1) ~~$P = 714(0.6500)^y$~~
 2) $P = 714(0.8500)^y$

3) $P = 714(0.9716)^y$
 4) ~~$P = 714(0.9750)^y$~~

$0.75^{\frac{1}{10}}$
 $= 0.9716$

17. The black bear population for a certain area of the Adirondacks can be modeled by the equation $B = 5835.943(1.026)^t$, where t is measured in years since 2010. Kieran would like to rewrite this model in terms of a 5-year growth rate. Kieran's model is best represented by

1) ~~$B = 5835.943(1.005147)^{\frac{t}{5}}$~~
 2) $B = 5835.943(1.005147)^{5t}$

3) $B = 5835.943(1.136938)^{\frac{t}{5}}$
 4) ~~$B = 5835.943(1.136938)^{5t}$~~

1.026^5
 1.136938

18. According to the USGS, an agency within the Department of Interior of the United States, the frog population in the U.S. is decreasing at the rate of 3.79% per year. A student created a model, $P = 12,150(0.962)^t$, to estimate the population in a pond after t years. The student then created a model that would predict the population after d decades. This model is best represented by

1) ~~$P = 12,150(0.461)^d$~~
 2) $P = 12,150(0.679)^d$

3) ~~$P = 12,150(0.996)^d$~~
 4) ~~$P = 12,150(0.998)^d$~~

0.962^{10}
 $= 0.6788$

19. Last year, the total revenue for Home Style, a national restaurant chain, increased according to the expression $(1.0525)^t$ where t represents the number of years. If this trend were to continue, which expression could the company's chief financial officer use to approximate their monthly percent increase in revenue? [Let m represent months.]

1) $(1.0525)^m$
 2) $(1.0525)^{\frac{12}{m}}$

3) $(1.00427)^m$
 4) $(1.00427)^{\frac{m}{12}}$

$1.0525^{\frac{1}{12}}$
 1.0043