

PARCC - Ch 5 Exp & Logs

1

Consider the equation $\frac{4x^2}{2^x} = 2$.

Part A

Which equation is equivalent to the equation shown? Select the correct answer.

A. $2^{x^2} = 2$

B. $2^{x^2-x} = 2$

C. $2^{2x} = 2$

D. $2^{2x^2-x} = 2$

Part B

Which values are solutions to the equation? Select all that apply:

A. -2

B. -1

C. $-\frac{1}{2}$

D. $\frac{1}{2}$

E. 1

F. 2

2

Given that $x > 0$, which expression is equivalent to $5\sqrt{xy} + 25\sqrt{x}$?

A. $5(xy)^{-1} + 25x^{-1}$

B. $25x^{\frac{1}{2}}(\sqrt{y} + 5)$

C. $\sqrt{x}(25y^{\frac{1}{2}} + 5)$

D. $5x^{\frac{1}{2}}(y^{\frac{1}{2}} + 5)$

1

calc

3. An investor deposited \$5,000 in an account that earns 1% annual interest. The amount of money in the account is represented by the function $f(x) = 5,000(1.01)^x$, where x represents the number of years since the account was opened.

What is the average rate of change of the function between $x = 2$ and $x = 7$?
Select from the drop-down menus to correctly complete the sentence.

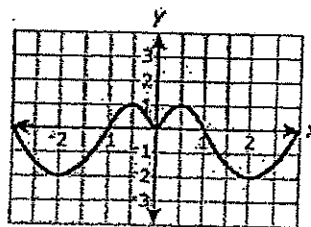
	Choose ...	Choose ...
	37.17	dollars
The average rate of change is	51.53	dollars per year
	52.04	years
	72.14	years per dollar

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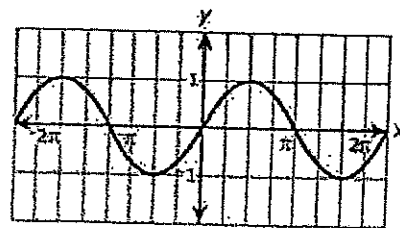
4

For each function described by the equations and graphs shown, indicate whether the function is even, odd, or neither even nor odd by selecting the appropriate cell.

$f(x) = 3x^2$ $g(x) = -x^3 + 5$



$h(x)$



$k(x)$

	$f(x)$	$g(x)$	$h(x)$	$k(x)$
Even	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Odd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neither Even nor Odd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(2)

Calculator Part (continued)

5

A scientist places 7.35 grams of a radioactive element in a dish. The half-life of the element is 2 days. After d days, the number of grams of the element remaining in the dish is given by the function $R(d) = 7.35 \left(\frac{1}{2}\right)^{\frac{d}{2}}$. Which statement is true about the equation when it is rewritten without a fractional exponent?

Select all that apply.

- A. An approximate equivalent equation is $R(d) = 7.35(0.250)^d$.
- B. An approximate equivalent equation is $R(d) = 7.35(0.707)^d$.
- C. The base of the exponent in this form of the equation can be interpreted to mean that the element decays by 0.250 grams per day.
- D. The base of the exponent in this form of the equation can be interpreted to mean that the element decays by 0.707 grams per day.
- E. The base of the exponent in this form of the equation can be interpreted to mean that about 25% of the element remains from one day to the next day.
- F. The base of the exponent in this form of the equation can be interpreted to mean that about 70.7% of the element remains from one day to the next day.

B

Calculator Part (continued)

6 17. The population of country A was 40 million in the year 2000 and has grown continually in the years following. The population P , in millions, of the country t years after 2000 can be modeled by the function $P(t) = 40e^{0.027t}$, where $t \geq 0$.

Part A

Based on the model, what was the average rate of change, in millions of people per year, of the population of country A from 2000 to 2005? Give your answer to the nearest hundredth.

Part B

Based on the model, the solution to the equation $50 = 40e^{0.027t}$ gives the number of years it will take for the population of country A to reach 50 million. What is the solution to the equation expressed as a logarithm?

- A. $0.027 \ln(1.25)$
- B. $\frac{\ln(1.25)}{0.027}$
- C. $\ln\left(\frac{1.25}{0.027}\right)$
- D. $\ln\left(\frac{0.027}{1.25}\right)$

Part C

Based on the model, in which years will the population of country A be greater than 55 million? Select all that apply.

- A. 2004
- B. 2007
- C. 2010
- D. 2013
- E. 2016
- F. 2019

Part D

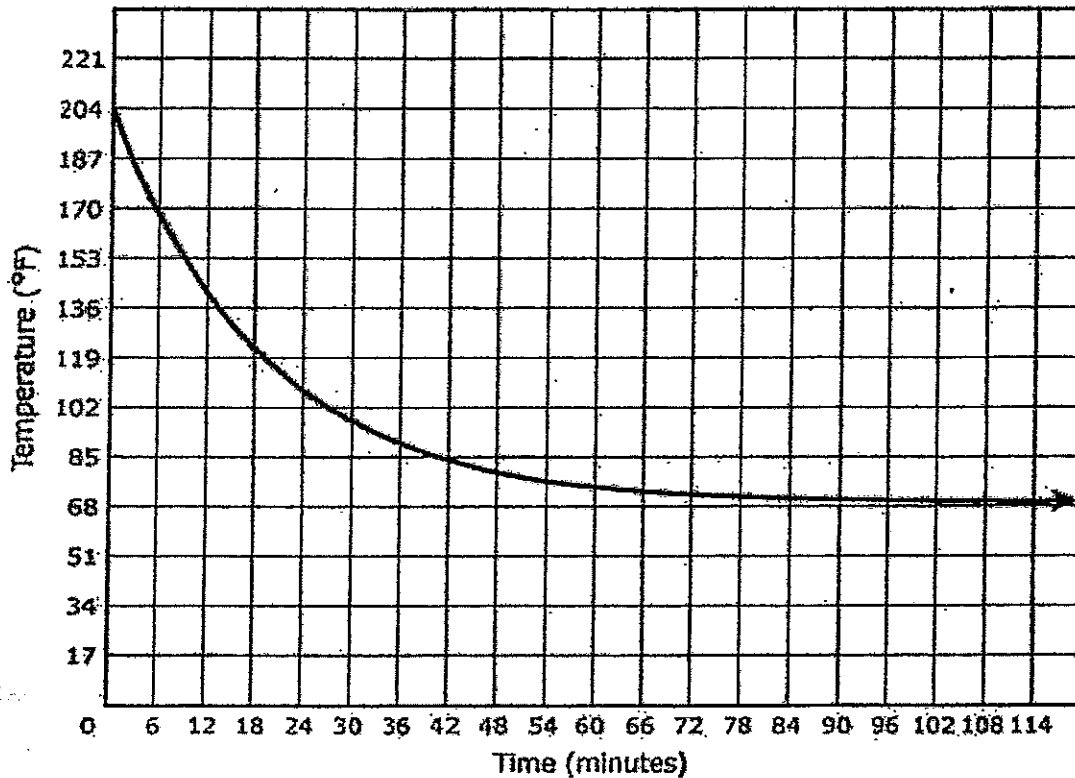
For another country, country B, the population M , in millions, t years after 2000 can be modeled by the function $M(t) = 35e^{-0.042t}$, where $t \geq 0$. Based on the models, what year will be the first year in which the population of country B will be greater than the population of country A?

- A. 2009
- B. 2012
- C. 2021
- D. The population of country B will not exceed the population of country A

✓ Calculator Part (continued)

7

The graph represents the temperature, in degrees Fahrenheit (F°), of tea for the first 120 minutes after it was poured into a cup.



Part A

Based on the graph, what was the temperature of the tea when it was first poured into the cup?

- A. 68° B. 114° C. 136° D. 204°

Part B

Based on the graph, as the number of minutes increased, what temperature did the tea approach?

- A. 68° B. 114° C. 136° D. 204°

5

Calculator Part (continued)

8

An investor deposits g dollars into an account at the beginning of each year for n years. The account earns an annual interest rate of r , expressed as a decimal. The amount of money S , in dollars, in the account can be determined by the formula

$$S = \frac{g}{r} [(1 + r)^n - 1]$$

Part A

Suppose the investor deposits \$500 a year for 10 years into an account that earns an annual interest rate of 5%. If no additional deposits or withdrawals are made, what will be the balance in the account at the end of 10 years?

- A. \$6,003.05 B. \$6,015.06 C. \$6,288.95 D. \$6,301.52

Part B

Enter a number in the answer box to complete the sentence. Give your answer to the nearest cent.

Suppose the investor wanted the balance in the account to be at least \$12,000 at the end of 10 years. At an annual interest rate of 5%, the amount of the yearly deposit should be at least \$.

6

Calculator Part (continued)

9 When approximating the age of an artifact that is less than 40,000 years old, the radioisotope carbon-14 can be used. Carbon-14 is an element with the property that every 5,730 years the mass of the element in a sample is reduced by half.

The mass of carbon-14 in an artifact can be modeled by an exponential function, m , of its age x .

Part A

Let A represent the original mass of carbon-14. Which function is the appropriate model?

A. $m(x) = A \cdot 2^{-5,730x}$

B. $m(x) = A \cdot 2^{\frac{-x}{5,730}}$

C. $m(x) = A \cdot 2^{\frac{-5,730x}{40,000}}$

D. $m(x) = A \cdot 2^{\frac{-40,000x}{5,730}}$

Part B

Based on the situation, which interval represents the domain of the function m ?

A. $0 \leq x < \infty$

B. $-\infty < x < \infty$

C. $0 \leq x \leq 5,730$

D. $0 \leq x \leq 40,000$

Part C

Which statements describe the graph of m in the coordinate plane? Select all that apply.

- A. The function m is a linear function.
- B. The function m is a nonlinear function.
- C. The function m is an increasing function.
- D. The function m is a decreasing function.
- E. The function m is a periodic function.

Part D

At what age would the mass of the carbon-14 in an artifact be one-fourth the original amount?

A. 1,432.5 years old

B. 2,865 years old

C. 11,460 years old

D. 22,920 years old

7

