Name	Date	Class
		-

### **Ready To Go On? Skills Intervention 7A** 7-1 Exponential Functions, Growth, and Decay

Find these vocabulary words in Lesson 7-1 and the Multilingual Glossary.

Vocabulary			
exponential growth	exponential decay	asymptote	base

#### **Graphing Exponential Functions**

A. Tell whether the function  $f(x) = 2.5^{x}$  shows growth or decay. Then graph.

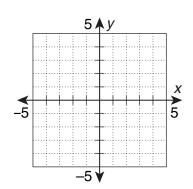
What is the value of the base? \_\_\_\_\_

Is the base greater than one or between one and zero?

Does the function show growth or decay? \_\_\_\_\_

Complete the table of values:

x	-3	-2	-1	0	1	2
у						



Graph the function using the table of values.

#### B. Tell whether the function $g(x) = 2(0.75^{x})$ shows growth or decay. Then graph.

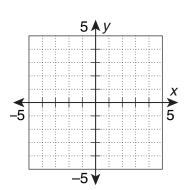
Find the value of the base.

Is the base greater than one or between one and zero?

Does the function show growth or decay?

Complete the table of values:

x	-3	-2	-1	0	1	2
у						



Graph the function using the table of values.

# SECTIONReady To Go On? Problem Solving Intervention7A7-1 Exponential Functions, Growth, and Decay

A function of the form  $f(x) = ab^x$ , where *a* is greater than 0 and *b* is greater than 1, is an exponential growth function which increases as *x* increases. When *b* is between 0 and 1 the function is called an exponential decay function, which decreases as *x* decreases.

The value of a new car is \$24,500, and its value decreases 9% each year.

- a. Write an exponential function representing the value of the car.
- b. Graph the function on a calculator.
- c. Use the graph to predict when the car's value will fall to \$10,000.

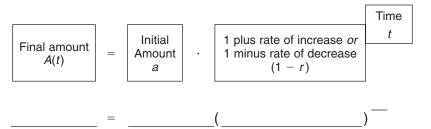
#### **Understand the Problem**

- 1. What is the initial value of the car?
- 2. Determine whether the function will show growth or decay.
- 3. Describe the growth factor or decay factor of the car's value.

#### Make a Plan

4. What do you need to determine?

5. Let A(t) represent the final value of the car. Write a function to model the value of the car.



6. Simplify the function in Exercise 5.

#### Solve

- 7. Graph the function in Exercise 6 on your calculator.
- Use the graph to predict when the value of the car will fall below \$10,000. Use the trace feature. It will take \_\_\_\_\_ years for the car's value to drop to \$10,000.

### Look Back

**9.** To check your solution, substitute the solution you predicted for *t* in Exercise 8 into the equation you wrote in Exercise 6. Let A(t) equal 10,000.

\_\_\_\_\_\_ = \_\_\_\_\_\_ (\_\_\_\_\_\_)^\_\_\_

10. Does your solution make the equation true?\_\_\_\_\_

Name	Date	Class
	<u> </u>	01400

**7A** 7-2 Inverses of Relations and Functions

Find these vocabulary words in Lesson 7-2 and the Multilingual Glossary.

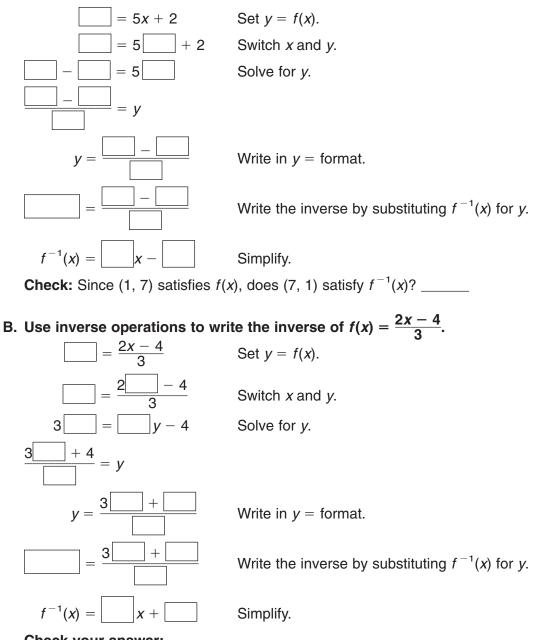
#### Vocabulary

inverse relation

inverse function

#### Writing Inverse Functions by Using Inverse Operations

A. Use inverse operations to write the inverse of f(x) = 5x + 2.



#### Check your answer:

Since (2, 0) satisfies f(x), does (0, 2) satisfy  $f^{-1}(x)$ ?

#### **Ready To Go On? Problem Solving Intervention** SECTION 7-2 Inverses of Relations and Functions - 7 A

To write the inverse of a function, switch x and y in the original function and solve for y.

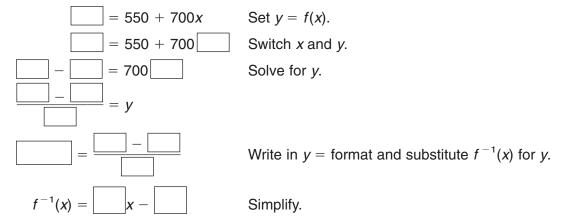
Ruth rents an apartment in the city for a \$550 initial realtor fee and a rate of \$700 per month. The total amount spent on the apartment can be expressed as a function of months, x, by f(x) = 550 + 700x. Find the inverse function. Then, use the inverse function to find the number of months Ruth rented the apartment if she spent a total of \$13,150.

#### **Understand the Problem**

1. Describe the fees Ruth spent on the apartment.

#### Make a Plan

- 2. What do you need to determine?
- **3.** Use inverse operations to write the inverse of f(x) that models months as a function of the total amount spent on the apartment.



#### Solve

**4.** Evaluate the inverse function for x =\$13,150.

\_\_\_\_  $f^{-1}(x) =$  $\mathbf{x}$  – = (13.150) -

Ruth rented the apartment for months.

#### Look Back

5. To check your solution, substitute the number of months into the original function.

f(x) = 550 + 700( ) =

6. Does your solution make the function equal \$13,150?

Name	

7.3 Logarithmic Functions

Find these vocabulary words in Lesson 7-3 and the Multilingual Glossary.

#### Vocabulary

logarithm

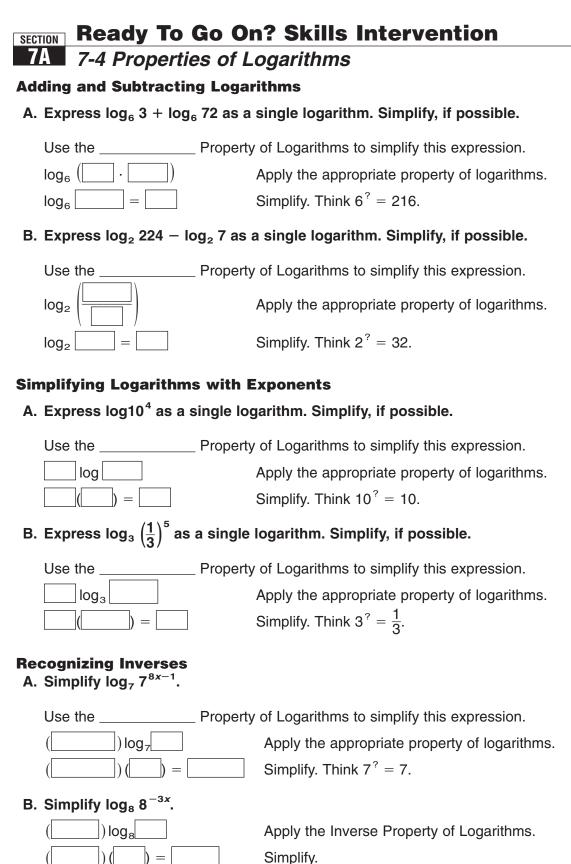
common logarithm

logarithmic function

Date Class

#### Converting from Exponential to Logarithmic Form

 $b^x = a$  $3^2 = 9$ Remember a logarithm is an exponent:  $\log_{b} a = x' \log_{3} 9 = 2$ A. Convert  $5^3 = 125$  to logarithmic form. Find the value of the base b. Find the value of the exponent x. Find the value of a. Write in the form  $\log_{b} a = x$ . B. Convert  $2^{-1} = 0.5$  to logarithmic form. Find the value of the base *b*. Find the value of the exponent x. Find the value of a. Write in the form  $\log_b a = x$ . **Converting from Logarithmic to Exponential Form** A. Convert  $\log_6 1 = 0$  to exponential form. Find the value of the base *b*. Find the value of the exponent x. Find the value of *a*. Write in the form  $b^x = a$ . B. Convert  $\log_{12} 144 = 2$  to exponential form. Find the value of the base *b*. Find the value of the exponent x. Find the value of a. Write in the form  $b^x = a$ .



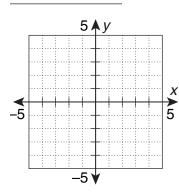
#### Date Class

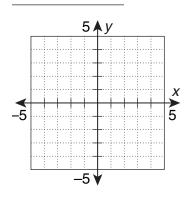
#### **Ready To Go On? Quiz** SECTION

#### **Exponential Functions, Growth, and Decay** 7-1

Tell whether the function shows growth or decay. Then graph.

**1.** 
$$f(x) = 2\left(\frac{1}{4}\right)^x$$
 **2.**  $f(x) = \frac{1}{3}(4)^x$ 





3. The population of a town is 20,000 and, it increases at a rate of 2% per year. Predict the town's population after 5 years.

#### 7-2 Inverses of Relations and Functions

4. Graph the relation and connect the points.

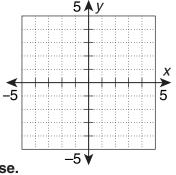
Then graph its inverse.

x	0	1	2	3
У	-5	-2	1	4

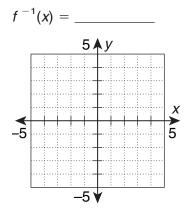
Graph each function. Then write and graph the inverse.

**5.** 
$$f(x) = \frac{x}{3}$$

$$f^{-1}(x) = \underline{\qquad}$$



6. 
$$f(x) = 4x + 5$$



#### 7. Sarah bought a set of bowls for a wedding present. She spent a total of \$37.80, which included a shipping charge of \$6.50 and 5% sales tax. What was the price of the bowls, including tax?

Write the exponential function in	-
<b>8.</b> 3 <sup>4</sup> = 81	<b>9.</b> $2.5^{\circ} = 1$
<b>10.</b> $5^{-2} = \frac{1}{25}$	<b>11.</b> 0.7 <sup><i>x</i></sup> = 0.343
Write the logarithmic function in	exponential form.
<b>12.</b> log <sub>2</sub> 128 = 7	<b>13.</b> $\log_{\frac{1}{5}} 125 = -3$
<b>14.</b> $\log_{0.16} 1 = 0$	<b>15.</b> log <sub>e</sub> x = 2
<b>16.</b> Use the given <i>x</i> -values to grap	bh $f(x) = 0.5^x$ ;
<b>7-4 Properties of Logarithn</b> Express as a single logarithm. S	-5 5 5 ↓ 5 ↓
Express as a single logarithm. S	-5 5 5 ↓ 5 ↓
	-5 -5 -5 ↓ -5 ↓ -5 ↓
Express as a single logarithm. S 17. $\log_4 64 + \log_4 \frac{1}{4}$ Simplify each expression.	-5 -5 -5 -5 -5 -5 -5 -5
Express as a single logarithm. S 17. $\log_4 64 + \log_4 \frac{1}{4}$	hs Simplify, if possible. 18. $\log_3 29.7 - \log_3 1.1$

## Ready To Go On? Quiz continued

SECTION 7A

## **SECTION** Ready To Go On? Enrichment

### The Richter Scale

The Richter scale is used to measure the magnitude, or size, of earthquakes. It is a logarithmic function given by the formula:

 $M = \frac{2}{3} \log \left(\frac{E}{10^{11.8}}\right)$ , where *M* is the magnitude and *E* is the number of ergs of

energy released.

Some of the largest earthquakes in the world are shown below. Use the table to answer the following questions.

Location	Year	Magnitude
Chile	1960	9.5
Prince William Sound, Alaska	1964	9.2
Coast of Northern Sumatra	2004	9.0
Kamchatka	1952	9.0
Coast of Ecuador	1906	8.8
Northern Sumatra, Indonesia	2005	8.7
Rat Island, Alaska	1965	8.7

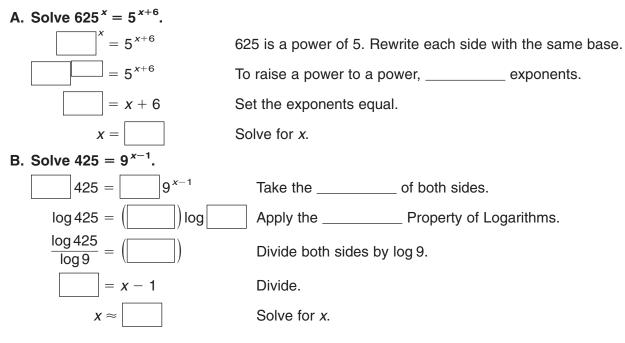
- 1. How much energy was released by the earthquake in Chile?
- 2. How much energy was released by the 2005 earthquake in Northern Sumatra?
- **3.** How many times as much energy is released by an earthquake with a magnitude of 9.0 than by an earthquake with a magnitude of 7.0?
- **4.** On July 26, 2005, an earthquake in western Montana registered a magnitude of 5.6 on the Richter scale. Find the energy released by the earthquake.

7-5 Exponential and Logarithmic Equations and Inequalities **7B** 

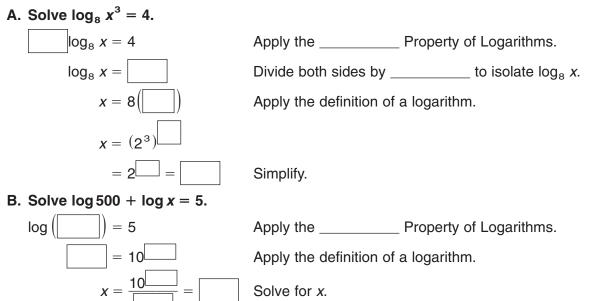
Find these vocabulary words in Lesson 7-5 and the Multilingual Glossary.

Vocabulary	
exponential equation	logarithmic equation

#### **Solving Exponential Equations**



#### **Solving Logarithmic Equations**



Name	Date	Class

### **Ready To Go On? Problem Solving Intervention 7**B 7-5 Exponential and Logarithmic Equations and Inequalities

You can use exponential functions to predict population growth.

The population of a small French village, currently 1250, grows at a rate of 2% per year. This growth can be expressed by the exponential equation  $P = 1250(1 + 0.02)^t$ , where *P* is the population after *t* years. Find the number of years it will take for the population to exceed 2000.

#### **Understand the Problem**

1. Describe the growth of the village's population.

#### Make a Plan

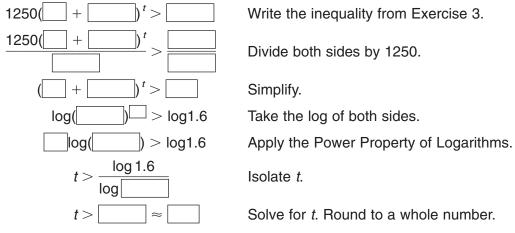
- 2. What do you need to determine?
- 3. Write an inequality that models the situation.



Define *P*. Substitute known values in the equation.

#### Solve

4. Solve the inequality for *t*.



Beginning in year \_\_\_\_\_, the village's population will exceed 2000 people.

#### Look Back

5. To check your solution, substitute your answer for t into the original exponential equation.

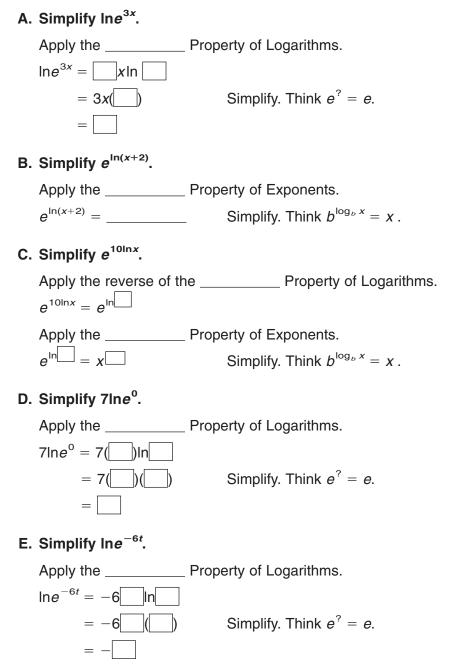
 $P = 1250(1 + 0.02)^{t} = 1250(1 + 0.02) \implies \approx \_$ 

6. Does your solution make the expression exceed 2000?

### **SECTION** Ready To Go On? Skills Intervention 7-6 The Natural Base, e Find these vocabulary words in Lesson 7-6 and the Multilingual Glossary.

Vocabulary natural logarithm natural logarithmic function half-life

#### Simplifying Expressions with e or In.



## SECTIONReady To Go On? Problem Solving Intervention7B7-6 The Natural Base, e

The half-life of a substance is the time it takes for half of the substance to break down or convert to another substance during the process of decay.

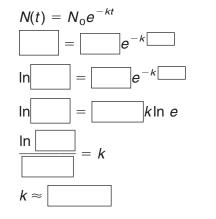
Neptunium-239, a radioactive isotope, has a half-life of 2.4 days. Use the decay function  $N(t) = N_0 e^{-kt}$  to determine the amount of a 100-gram sample that remains after 20 days.

#### **Understand the Problem**

- 1. Describe the decay of neptunium-239.
- 2. What do you need to determine?

#### Make a Plan

**3.** Find the decay constant, *k*, for neptunium-239. Remember that half of the initial quantity will remain after 2.4 days.



Substitute 1 for  $N_0$ , 2.4 for *t*, and  $\frac{1}{2}$  for N(t). Simplify and take the natural log of both sides. Apply the Power Property of Logarithms. Simplify and isolate *k*. Solve for *k*. Round to 4 decimal places.

#### Solve

1

**4.** Write the decay function using your value for k and solve for N(t).

$$N(t) = N_0 e^{-kt}$$

$$N(t) = e^{-t}$$
Substitute 100 for  $N_0$ , \_\_\_\_\_ for  $t$ , and your value for  $k$ .  

$$N(t) \approx e^{-t}$$
Solve for  $N(t)$ .

#### Look Back

- 5. To check your solution, substitute your answers for N(t) and k into the decay function.
  - $N(t) = N_0 e^{-kt}$
  - $0.31 = 100e^{-0.2888t} \rightarrow t \approx$
- 6. Do your answers for *N*(*t*) and *k* result in *t* equaling 20 days? \_\_\_\_\_

**7**B 7-7 Transforming Exponential and Logarithmic Functions

Find these vocabulary words in Lesson 7-7 and the Multilingual Glossary.

Vocabulary

transformation parent function

#### **Writing Transformed Exponential Functions**

#### A. $f(x) = 7^{x}$ is translated 4 units left and stretched vertically by a factor of 5.

To translate a function 4 units horizontally to the left should you add or

subtract 4 from x?

$f(\mathbf{x}) = $	Start by identifying the parent function.
f(x) = 7	To translate 4 units left, replace $x$ with $x + 4$ .
f(x) =	Stretch vertically by multiplying by 5.

## B. $f(x) = 11^{x}$ is horizontally compressed by a factor of $\frac{1}{4}$ and reflected across the *y*-axis.

To reflect a function across the *y*-axis, should you change the sign on the coefficient or the exponent?

$f(\mathbf{x}) =$	Start by identifying the parent function.
f(x) = 11	Horizontally compress by multiplying <i>x</i> by 4.
f(x) = 11	Reflect across the <i>y</i> -axis by replacing <i>x</i> with $-x$ .

### Writing Transformed Logarithmic Functions

A.  $f(x) = \log_2 x$  is vertically compressed by a factor of  $\frac{1}{3}$  and translated 5 units down.

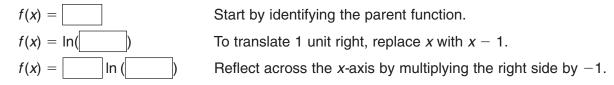
To translate a function 5 units down, should you add or subtract 5 from x?



Start by identifying the parent function.

- Vertically compress by multiplying the right side by  $\frac{1}{3}$ .
- To translate 5 units down, subtract 5 from the right side.

### B. $f(x) = \ln x$ is translated 1 unit right and reflected across the x-axis.



Date	Class

### **Ready To Go On? Skills Intervention** 70 7-8 Curve Fitting with Exponential and Logarithmic Models

Find this vocabulary word in Lesson 7-8 and the Multilingual Glossary.

Vocabulary

exponential regression

#### **Identifying Exponential Data**

Name \_\_\_\_\_

A. Determine whether *f* is an exponential function of *x*. If so, find the constant ratio.

x	-1	0	1	2	3	4
<i>f</i> ( <i>x</i> )	<u>1</u> 3	1	3	9	27	81

For linear functions, \_\_\_\_\_ are constant.

For exponential functions, the \_\_\_\_\_\_ of each *y*-value and the previous value is constant.

Using the table of values:

a. Find the first differences.

b. Find the ratios of the f(x) terms.

Is the function linear or exponential?

If the function is exponential, what is the constant ratio?

Use linear or exponential regression to find a function that models the data.

f(x) =\_\_\_\_\_

### B. Determine whether f is an exponential function of x. If so, find the constant ratio.

X	-1	0	1	2	3	4
<i>f</i> ( <i>x</i> )	-1.5	1	3.5	6	8.5	11

Using the table of values:

a. Find the first differences.

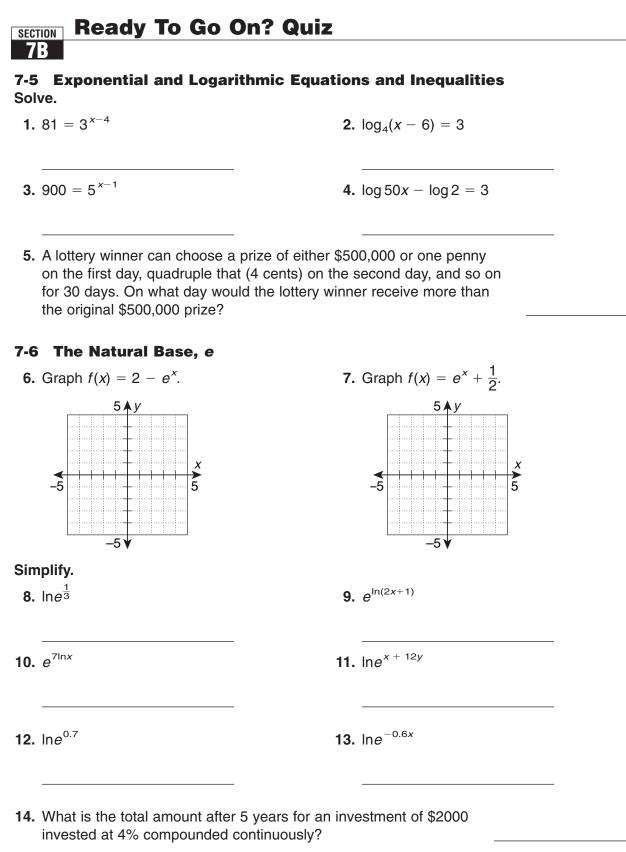
b. Find the ratios of the f(x) terms.

Is the function linear or exponential?

If the function is exponential, what is the constant ratio? \_\_\_\_

Use linear or exponential regression to find a function that models the data.

 $f(x) = \_\_\_+ \_\_\_$ 



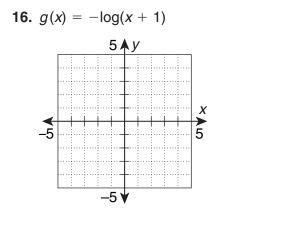
**15.** Use the decay function  $N_t = N_0 e^{-kt}$  to determine how much of 20 grams of carbon-14 will remain after 500 years. Carbon-14's half-life is 5730 years.

Date	Class

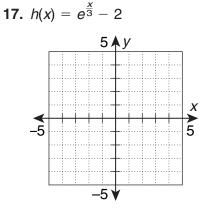
## SECTION Ready To Go On? Quiz continued

#### 7-7 Transforming Exponential and Logarithmic Functions

Graph the function. Find the *y*-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function.



Name



y-intercept:	y-intercept:
asymptote:	asymptote:
transformation:	transformation:

#### Write the transformed function.

**18.**  $f(x) = 5^x$  is vertically stretched by 4 and reflected across the *y*-axis.

**19.**  $f(x) = \ln(3x)$  is horizontally compressed by  $\frac{1}{4}$  and vertically translated 1 unit up.

## **7-8 Curve Fitting with Exponential and Logarithmic Models** Determine whether *y* is an exponential function of *x*. If so, find the constant ratio and use exponential regression to find a function that models the data.

20.	x	0	1	2	3	4	5
	у	2	6	18	54	162	486

21.	x	-2	-1	0	1	2	3
	у	-10	-5	0	5	15	30

## **SECTION** Ready To Go On? Enrichment

#### Compounding Continuously

When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula:

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

As *n* increases, the interest approaches that of *continuously* compounded interest. The formula for *continuously* compounded interest is:

$$A = Pe^{rt}$$

#### Compare compound interest intervals by completing the table.

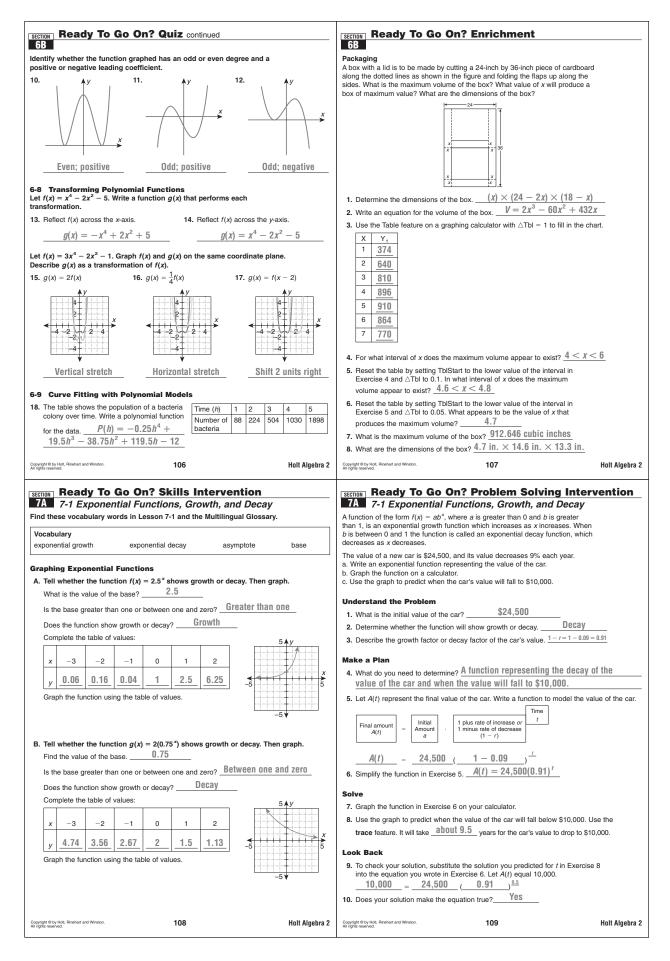
Principal ( <i>P</i> )	Rate (r)	Time in years ( <i>t</i> )	Compound Interval ( <i>n</i> )	Amount (A)
2000	5%	10	Semi-annually $n = 2$	
2000	5%	10	Quarterly $n = 4$	
2000	5%	10	Monthly $n = 12$	
2000	5%	10	Daily n = 365	
2000	5%	10	Continuously	

**1.** Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.

2. Which interval earns more money for an investment? \_

#### Answer each of the following questions.

- **3.** How long will it take an investment of \$1000 to triple in value if it is invested at a rate of 8% compounded monthly?
- **4.** How long will it take an investment of \$2500 to double in value if it is invested at a rate of 6% compounded continuously?
- 5. Carolyn has \$6825.70 in her savings account. She invested her money at a 4% interest rate for 5 years compounded continuously. How much did she originally invest?



<b>SECTION</b> Ready To Go On? Skills Intervention	<b>SECTION</b> Ready To Go On? Problem Solving Intervention	
7A 7-2 Inverses of Relations and Functions	7A 7-2 Inverses of Relations and Functions	
Find these vocabulary words in Lesson 7-2 and the Multilingual Glossary.	To write the inverse of a function, switch x and y in the original function and solve	
Vocabulary inverse relation inverse function	for y. Ruth rents an apartment in the city for a \$550 initial realtor fee and a rate of \$700 per month. The total amount spent on the apartment can be expressed as a function of months, x, by $f(x) = 550 + 700x$ . Find the inverse function. Then, use the inverse function to find the number of months Ruth rented the apartment if she spent a total	
Writing Inverse Functions by Using Inverse Operations A. Use inverse operations to write the inverse of $f(x) = 5x + 2$ .	of \$13,150.	
	Understand the Problem	
$\begin{array}{c} \boxed{\chi} = 5 \underbrace{y} + 2  \text{Switch } x \text{ and } y. \\ \hline \chi = - \underbrace{2} = 5 \underbrace{y}  \text{Solve for } y. \\ \hline \end{array}$	1. Describe the fees Ruth spent on the apartment. <u>She spent an initial fee of</u> \$550 and a monthly fee of \$700.	
$\frac{x}{5} = y$	Make a Plan	
$y = \frac{x}{5}$ Write in $y =$ format.	2. What do you need to determine? The inverse function of $f(x)$ and how many months result in a total amount spent of \$13,150.	
$\boxed{f^{-1}(x)} = \boxed{x - \boxed{2}}$ Write the inverse by substituting $f^{-1}(x)$ for y.	<ol> <li>Use inverse operations to write the inverse of f(x) that models months as a function of the total amount spent on the apartment.</li> </ol>	
$f^{-1}(x) = \left[\frac{1}{5}\right]x - \left[\frac{2}{5}\right]$ Simplify.	y = 550 + 700x Set $y = f(x)$ .	
<b>Check:</b> Since (1, 7) satisfies $f(x)$ , does (7, 1) satisfy $f^{-1}(x)$ ? Yes	$\boxed{X} = 550 + 700 \qquad \qquad$	
B. Use inverse operations to write the inverse of $f(x) = \frac{2x-4}{3}$ .	$\frac{x}{x} - \frac{550}{550} = 700 \underbrace{y}_{x}$ Solve for y. $\frac{x}{700} = y$	
$\boxed{y} = \frac{2x-4}{3} \qquad \text{Set } y = f(x).$		
$\underline{\chi} = \frac{2\underline{y} - 4}{3}$ Switch x and y.	$\boxed{f^{-1}(x)} = \underbrace{\frac{x}{700}}_{700} - \underbrace{550}_{700}$ Write in $y = \text{ format and substitute } f^{-1}(x) \text{ for } y.$	
$3 \boxed{x} = \boxed{2} y - 4$ Solve for y.	$f^{-1}(x) = \boxed{\frac{1}{700}} x - \boxed{\frac{11}{14}}$ Simplify.	
	$f(\mathbf{x}) = \underline{f(0)} \mathbf{x} - \underline{f(1)}$ Simplify.	
$\frac{3 x + 4}{2} = y$	Solve	
	<b>4.</b> Evaluate the inverse function for $x = $ \$13,150.	
$y = \frac{3 x + 4}{2}$ Write in $y =$ format.	$f^{-1}(x) = \frac{1}{700}x - \frac{11}{14} = \frac{1}{700}(13,150) - \frac{11}{14} = \frac{18}{14}$	
$\boxed{f^{-1}(x)} = \frac{3 \boxed{x} + \boxed{4}}{\boxed{2}}$ Write the inverse by substituting $f^{-1}(x)$ for y.	Ruth rented the apartment for <u>18</u> months.	
$f^{-1}(\mathbf{x}) = \begin{bmatrix} \frac{3}{2} \\ \frac{3}{2} \end{bmatrix} \mathbf{x} + \begin{bmatrix} 2 \end{bmatrix}$ Simplify.	Look Back	
Check your answer:	5. To check your solution, substitute the number of months into the original function. f(x) = 550 + 700(18) = -13,150	
Since (2, 0) satisfies $f(x)$ , does (0, 2) satisfy $f^{-1}(x)$ ? Yes	f(x) = 550 + 700((10)) = -10,100 6. Does your solution make the function equal \$13,150? Yes	
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SECTION Ready To Go On? Skills Intervention	SECTION Ready To Go On? Skills Intervention	
7A 7-3 Logarithmic Functions	7A 7-4 Properties of Logarithms	
<b>7A</b> 7-3 Logarithmic Functions Find these vocabulary words in Lesson 7-3 and the Multilingual Glossary.	7A 7-4 Properties of Logarithms Adding and Subtracting Logarithms	
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TA         7-3 Logarithmic Functions           Find these vocabulary words in Lesson 7-3 and the Multilingual Glossary.           Vocabulary           logarithm         common logarithm	7A       7-4 Properties of Logarithms         Adding and Subtracting Logarithms         A. Express log <sub>6</sub> 3 + log <sub>6</sub> 72 as a single logarithm. Simplify, if possible.         Use the        Product         Property of Logarithms to simplify this expression.         log <sub>6</sub> (3 · 72)       Apply the appropriate property of logarithms.	
TA       7-3 Logarithmic Functions         Find these vocabulary words in Lesson 7-3 and the Multilingual Glossary.         Vocabulary         logarithm       common logarithm         logarithm       common logarithm         Converting from Exponential to Logarithmic Form         Remember a logarithm is an exponent: $b^x = a$ , $3^2 = 9$	TA       7-4 Properties of Logarithms         Adding and Subtracting Logarithms         A. Express $log_6 3 + log_6 72$ as a single logarithm. Simplify, if possible.         Use the       Product         Property of Logarithms to simplify this expression. $log_6$ $(3 \cdot 72)$ Apply the appropriate property of logarithms. $log_6$ $(216) = (3)$ Simplify. Think $6^7 = 216$ .	
Converting from Exponential to Logarithmic Form         Remember a logarithm is an exponent: $b^x = a$ $3^2 = 9$ $\log_b a = x^2$ $\log_3 9 = 2$	TA       7-4 Properties of Logarithms         Adding and Subtracting Logarithms         A. Express log <sub>6</sub> 3 + log <sub>6</sub> 72 as a single logarithm. Simplify, if possible.         Use the       Product         Property of Logarithms to simplify this expression.         log <sub>6</sub> (3 · (72))       Apply the appropriate property of logarithms.         log <sub>6</sub> (216)       3       Simplify. Think 6 <sup>7</sup> = 216.         B. Express log <sub>2</sub> 224 - log <sub>2</sub> 7 as a single logarithm. Simplify, if possible.	
Constraint       Common logarithmic Functions         Find these vocabulary words in Lesson 7-3 and the Multilingual Glossary.         Vocabulary         logarithm       common logarithm         logarithm       common logarithmic Form         Remember a logarithm is an exponent: $b^x = a$ $3^2 = 9$ $log_b a = x^2$ $log_a g = 2$ A. Convert 5 <sup>3</sup> = 125 to logarithmic form.	<ul> <li>7.4 Properties of Logarithms</li> <li>Adding and Subtracting Logarithms</li> <li>A. Express log<sub>6</sub> 3 + log<sub>6</sub> 72 as a single logarithm. Simplify, if possible.</li> <li>Use the <u>Product</u> Property of Logarithms to simplify this expression.</li> <li>log<sub>6</sub> (3 · 72) Apply the appropriate property of logarithms.</li> <li>log<sub>6</sub> 216 = 3 Simplify. Think 6<sup>7</sup> = 216.</li> <li>B. Express log<sub>2</sub> 224 - log<sub>2</sub> 7 as a single logarithm. Simplify, if possible.</li> <li>Use the <u>Quotient</u> Property of Logarithms to simplify this expression.</li> </ul>	
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SECTION       Ready To Go On? Quiz         7A         7.1 Exponential Functions, Growth, and Decay         Tell whether the function shows growth or decay. Then graph.         1. $f(x) = 2(\frac{1}{4})^x$ 2. $f(x) = \frac{1}{3}(4)^x$	<ul> <li>Ready To Go On? Quiz continued</li> <li>7A</li> <li>7. Sarah bought a set of bowls for a wedding present. She spent a total of \$37.80, which included a shipping charge of \$6.50 and 5% sales tax. What was the price of the bowls, including tax?</li> <li>c = 1.05(p + 6.50); p = \$29.50</li> </ul>
$\begin{array}{c c} \underline{Decay} & \underline{Growth} \\ \hline 5 & 5 \\ \hline 5 & 5 \\ \hline -5 \\$	<b>7.3 Logarithmic Functions</b> Write the exponential function in logarithmic form. 8. $3^4 = 81$ $10g_3 \ 81 = 4$ 9. $2.5^\circ = 1$ $10g_{2.5} \ 1 = 0$ 10. $5^{-2} = \frac{1}{25}$ $10g_5 \ \frac{1}{25} = -2$ 11. $0.7^x = 0.343$ $10g_{0.7} \ .343 = x$ Write the logarithmic function in exponential form. 12. $\log_2 128 = 7$ $2^7 = 128$ 13. $\log_5 125 = -3$ $(\frac{1}{5})^{-3} = 125$ 14. $\log_{0.16} 1 = 0$ $0.16^\circ = 1$ 15. $\log_e x = 2$ $e^2 = x$
3. The population of a town is 20,000 and, it increases at a rate of 2% per year. Predict the town's population after 5 years. $p = 20,000(1 + 0.02)^5 \approx 22,082 \text{ people}$ 7.2 Inverses of Relations and Functions 4. Graph the relation and connect the points. Then graph its inverse. $\boxed{\frac{x \ 0 \ 1 \ 2 \ 3}{y \ -5 \ -2 \ 1 \ 4}}$	14. $\log_{0.16} 1 = 0$ 15. $\log_e x = 2$ $e^2 = x$ 16. Use the given x-values to graph $f(x) = 0.5^x$ ; x = -2, -1, 0, 1, 2. Then graph the inverse function. 7.4 Properties of Logarithms Express as a single logarithm. Simplify, if possible.
Graph each function. Then write and graph the inverse. 5. $f(x) = \frac{x}{3}$ $f^{-1}(x) = \frac{3x}{5 + y}$ 6. $f(x) = 4x + 5$ $f^{-1}(x) = \frac{3x}{4} - \frac{5}{4}$ $f^{-1}(x) = \frac{4}{5 + y}$ $f^{-1}(x) = \frac{5 + y}{5 + y}$ $f^{-1}(x) = \frac{5 + y}{5 + y}$	17. $\log_4 64 + \log_4 \frac{1}{4}$ 18. $\log_3 29.7 - \log_3 1.1$
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<b>Ready To Go On? Enrichment</b> <b>TA</b> <b>The Richter Scale</b> The Richter scale is used to measure the magnitude, or size, of earthquakes. It is a logarithmic function given by the formula: $M = \frac{2}{3} \log \left( \frac{E}{10^{11.8}} \right)$ , where <i>M</i> is the magnitude and <i>E</i> is the number of ergs of	Ready To Go On? Skills Intervention           7B         7-5 Exponential and Logarithmic Equations and Inequalities           Find these vocabulary words in Lesson 7-5 and the Multilingual Glossary.           Vocabulary exponential equation         logarithmic equation
7A The Richter Scale The Richter scale is used to measure the magnitude, or size, of earthquakes. It is	7B 7-5 Exponential and Logarithmic Equations and Inequalities Find these vocabulary words in Lesson 7-5 and the Multilingual Glossary. Vocabulary
<b>TA</b> <b>The Richter Scale</b> The Richter scale is used to measure the magnitude, or size, of earthquakes. It is a logarithmic function given by the formula: $M = \frac{2}{3} \log \left(\frac{E}{10^{(1:6)}}\right)$ , where <i>M</i> is the magnitude and <i>E</i> is the number of ergs of energy released. Some of the largest earthquakes in the world are shown below. Use the table	7B       7-5 Exponential and Logarithmic Equations and Inequalities         Find these vocabulary words in Lesson 7-5 and the Multilingual Glossary.         Vocabulary exponential equation         logarithmic equation         Solving Exponential Equations
<b>7A The Richter Scale</b> The Richter Scale         The Richter Scale         The Richter Scale         The Richter Scale         Memory and the formula: $M = \frac{2}{3} \log \left( \frac{E}{10^{11.8}} \right)$ , where M is the magnitude and E is the number of ergs of energy released.         Some of the largest earthquakes in the world are shown below. Use the table to answer the following questions.         Inclusion Year Magnitude         Coation Year Magnitude         Prince William Sound, Alaska 1964 9.2         Coast of Northern Sumatra 2004 9.0         Kamchatka 1952 9.0         Coast of Ecuador 1906 8.8         Northern Sumatra, Indonesia 2005 8.7         Rat Island, Alaska 1965 8.7         1. How much energy was released by the earthquake in Chile?	TB       7-5 Exponential and Logarithmic Equations and Inequalities         Find these vocabulary words in Lesson 7-5 and the Multilingual Glossary.         Vocabulary         exponential equation         logarithmic equation         Solving Exponential Equations         A. Solve 625 * = 5 **6 $5^{4^{x}} = 5^{x+6}$ $5^{4^{x}} = 5^{x+6}$ $5^{4x} = 5^{x+6}$ $5^{4x} = 5^{x+6}$ To raise a power to a power, <u>multiply</u> exponents. $4x = x + 6$ Solve for x.         B. Solve 425 = $9^{x-1}$ .         Image: Image and the state in the st

<b>Terms Ready to call of the Status Base</b> , <b>a</b> The half of the Natural Base, <b>a</b> The half of the substance to break down or correct the nonther substance during the process of decay. <b>Product Weak</b> <b>Product Status a</b> half of the substance to break down or correct the nonther substance during the process of decay. <b>Product Status a</b> half of the isotope has a half of the isotope ducays every 2.4 days. <b>Other 20</b> days. <b>Writes 7 and formation of the status of the substance of the su</b>		? Problem Solving Interve			o On? Skills Interver	ntion
The spectrate is using the spectrate brance and and of generation is a property of the spectrate brance and spectrate brand and spectrate brance and spectrate brance		•				al Glossary
			Find	these vocabulary work	is in Lesson 7-6 and the Multilingu	ai Giossary.
	2% per year. This growth can be expr	essed by the exponential equation		-		
Subscription       1.11 <td><math>P = 1250(1 + 0.02)^{t}</math>, where P is the</td> <td>population after t years. Find the number</td> <td>natu</td> <td>Iral logarithm</td> <td>natural logarithmic function</td> <td>nalt-lite</td>	$P = 1250(1 + 0.02)^{t}$ , where P is the	population after t years. Find the number	natu	Iral logarithm	natural logarithmic function	nalt-lite
<ul> <li>A single year.</li> <li>A set year and a set year and a</li></ul>	or years it will take for the population					
a mice 2 to gray upar. <b>Hand 2 to be part of a models for equations A mice 1 mice 1 mice 1 mice a model of the values of the equations A mice 1 mice 1 mice 1 mice 1 mice a model of the equations A mice 1 mice 1 mice 1 mice 1 mice a model of the equations A mice 1 mice 1 mice 1 mice 1 mice a model of the equations A mice 1 mice 1 mice 1 mice 1 mice 1 mice 1 mice a model of the equations A mice 1 m</b>	Understand the Problem		-		with e or In.	
Note a number of production in the survey much the subscription is a state or registery.       Image: State is a state of the survey of the subscription is a state or registery.         Note a survey of the subscription is a state or registery.       Image: State is a state of the survey of the subscription is a state or registery.         Note a survey of the subscription is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state is a state or registery.       Image: State is a state is a state or registery.         Image: State is a state is a state or registery.       Image: State is a state is a state or registery.         Image: State is a state is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state or registery.       Image: State is a state or registery.         Image: State is a state or	1. Describe the growth of the village	's population. The village's population (	grows at A.S		roporty of Logorithmo	
<b>into a row into a row into a row call to determine into a row call to a substate into a value in the equation.   <b>into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate into a value in the equation. into a row call to a substate in the equation. into a row call to a substate in the row call to a row call to row call to a row </b></b>	a rate of 2% per year.				roperty of Loganthins.	
<ul> <li>a. Wate to space water to determine y When the willings's population will exceed a space will be a s</li></ul>	Make a Plan				Simplify Think $\rho^{?} = \rho$	
2000 arguing		When the village's population will ex	kceed		ompiny: mint o o.	
<ul> <li>a. We integrately that models the set balance.</li> <li>b. The integrate is the set of th</li></ul>						
$ \begin{aligned}                                   $	3. Write an inequality that models th	e situation.				
The field of a bandward by $e^{-1}$ and $e^$	P>2000	Define P.				
Solve         Solve the inclusion for 1         Solve the inclusion f	1250(1 + 0.02) <sup>t</sup> > 2000	Substitute known values in the equation.	e		Simplify. Think $p^{-a_{B}x} = x$ .	
<ul> <li>4. Set the interplay for <i>i</i> and <i>i</i></li></ul>	Salua				_	
$ \frac{1}{2 \text{ soft}} + \left[ \frac{1}{2 \text{ soft}} \right] \times \left[ \frac{1}{2 \text{ soft}} \right] = \left[ \frac{1}{2 \text{ soft}} \right] \times \left[ \frac{1}{2 \text{ soft}} \right] \times$					Property of Logarithms.	
		Write the inequality from Exercise 3				
1200 · · · · · · · · · · · · · · · · · ·		white the mequanty from Exercise 3.				
$ \begin{array}{c} \begin{array}{c} \begin{array}{c} 0 \\ \hline \\ \\ \end{array} \end{array} \end{array} \\ \begin{array}{c} \begin{array}{c} 0 \\ \hline \\ \end{array} \end{array} \\ \begin{array}{c} 0 \\ \hline \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \end{array} \\ \begin{array}{c} 0 \\ \hline \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\ \begin{array}{c} 0 \\ \end{array} \\$		Divide both sides by 1250.	e	$m_{x} = x_{10}$	Simplify. Think $b^{\log_b x} = x$ .	
$\begin{aligned} & \text{price }  \text$		Simplify.	D. S	Simplify 7Ine <sup>0</sup> .		
$ \frac{\left[ \log \left( \frac{1}{12} \right) + \log 1 \right]}{\left[ \log \left( \frac{1}{12} \right) + \log 1 \right]} + \log 1 \log$					roperty of Logarithms.	
$ \begin{array}{c} - \frac{1}{\sqrt{2}} \int_{   _{-1}^{\infty}  _{-1}^$			7	Ine <sup>o</sup> = 7( <b>0</b> )In <b>e</b>		
$ \left( \begin{array}{c} \right) $	t > log 1.6	Isolate t			Simplify. Think $e^{?} = e$ .	
Beginning in year $\frac{4}{2}$ the village's population will exceed 2000 people. <b>Lock tank</b> a. To check your solution, substitute your answer for <i>i</i> the through exponential exponentis exponential exponential exponentis exponential e				= 0		
$ \begin{array}{llllllllllllllllllllllllllllllllllll$				implify Ine <sup>-6t</sup>		
Lock and N	Beginning in year $\_24$ , the vill	age's population will exceed 2000 people.			roperty of Logarithms	
<ul> <li>a. The tack your contains, tabeling by our answers for / into the original exponential equation: μ = 2 (1/2) (1 + 0.02 [2/2] = 2 (201 + 0.02 [2/2] = (201 + 0.02 [2/2</li></ul>	Look Back				openty of Loganamo.	
P = 1280(1 + 0.02/=2180(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/=1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/ET) = 2011           P = 1280(1 + 0.02/ET) = 2011             P = 1280(1 + 0.02/ET) = 2011           P = 1000(1 + 0.02/ET)             P = 1280(1 + 0.02/ET) = 2011           P = 1000(1 + 0.02/ET)             P = 1000(1 + 0.02/ET)           P = 1000(1 + 0.02/ET)             P = 1000(1 + 0.02/ET)           P = 1000(1 + 0.02/ET)           P = 1000(1 + 0.02/ET)             P = 1000(1 + 0.02/ET)           P = 1000(1 + 0.02/ET)           P = 1000(1 + 0.02/ET)		your answer for t into the original exponentia			Simplify. Think $e^{?} = e_{.}$	
A. Does your solution make the expression sourced 2000? Yos         Marging The source in the expression sourced 2000? Yos         Marging The source in the expression sourced 2000? Yos         Marging The Source in the expression sourced 2000? Yos         Marging The Source in the expression sourced 2000? Yos         Marging The Source in t					ompiny: mint o o.	
<b>Final Product Produc</b>	6. Does your solution make the exp	ression exceed 2000? Yes				
<b>Final Product Produc</b>						
<b>B</b> 2. F 2. The Natural Base, e The half-life of a substance is the lith set half of the substance to break down or convert to another substance during the process of decay. Neptonium-239, a radioactive isotope, has a half-life of 2.4 days. Use the decay function M(1) - M( $e^{-\frac{1}{2}}$ To determine the amount of a 100 gram sample that remains after 20 days. <b>Discribe the decay of neptonium-239.</b> Half of the isotope decays every 2.4 days. Note the decay of neptonium-239. Half of the isotope decays every 2.4 days. <b>Note a Pian</b> a. Obscribe the decay constant, k, for neptonium-239. Remember that half of the initial quantity will remain after 2.4 days. $N(1) = Ne^{-\frac{\pi}{2}}$ Substitute 1 for Ne, 2.4 for t, and $\frac{1}{2}$ for N(1). $h^{\frac{1}{2}} = -\frac{1}{2} = e^{-\frac{\pi}{2}}$ Simplify and take the natural log ob the ides. $h^{\frac{1}{2}} = -\frac{1}{2} = e^{-\frac{\pi}{2}}$ Simplify and take the natural log ob the ides. $h^{\frac{1}{2}} = -\frac{1}{2} = e^{-\frac{\pi}{2}}$ Simplify and isolate K. $k^{-\frac{1}{2}} = \frac{1}{2} = k$ Simplify and isolate K. $k^{-\frac{1}{2}} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2}$ (and the isolage for K Round to 4 decimal places. <b>Distribution</b> 100 for Ne, $\frac{20}{2}$ for t, and your value for k, $n(1) = Ne^{-\frac{\pi}{2}}$ Substitute 10 for Ne, $\frac{20}{2}$ for t, and your value for k, $n(1) = \sqrt{\frac{\pi}{2}}$ Substitute 10 for Ne, $\frac{20}{2}$ for t, and your value for k, $n(1) = \sqrt{\frac{\pi}{2}}$ Substitute 10 for Ne, $\frac{20}{2}$ for t, and your value for k, $n(1) = \sqrt{\frac{\pi}{2}}$ Substitute 10 for Ne, $\frac{20}{2}$ for t, and your value for k, $n(1) = \sqrt{\frac{\pi}{2}}$ Substitute your answers for N(1) and k into the decay function. $n(1) = \sqrt{\frac{\pi}{2}}$ Substitute your answers for N(1) and k into the decay function. $n(1) = \frac{1}{2} e^{-\frac{\pi}{2}}$ Substitute your answers for N(1) and k into the decay function. $n(2) = \frac{1}{2} e^{-\frac{\pi}{2}}$ Substitute your answers for N(1) and k into the decay function. $n(2) = \frac{1}{2} e^{-\frac{\pi}{2}}$ Substitute your answers for N(1) and k into the decay function. $n(2) = \frac{1}{2} e^{-\frac{\pi}{2}}$ Substitute your a	Copyright @ by Holt, Rinehart and Winston. All rights reserved.	118	Holt Algebra 2 Copyright All rights	© by Holt, Rinehart and Winston. reserved.	119	Holt Algebra 2
<ul> <li>The substance is the time if takes for half of the substance to break form or over 0, M<sub>0</sub> = M<sub>0</sub> = <sup>-1</sup> (2 days). Use the decay former is the amount of a 100-gram sample that remains after 20 days.</li> <li>Describe the decay of neptronences. <u>How much of 100 grams of neptronences of decays over 9, 2, 4 days</u>.</li> <li>Describe the decay of neptronences. <u>How much of 100 grams of neptronences of the constructions.</u> <u>Add</u></li> <li>The does works on the form x<sup>-2</sup>. <u>How much of 100 grams of neptronences of the constructions.</u> <u>Add</u></li> <li>The does works on the form x<sup>-2</sup>. <u>Add</u></li> <li>The does works on the does works on the form the does with x<sup>-1</sup>. <u>Add</u></li> <li>The does works on the form x<sup>-2</sup>. <u>Add</u></li> <li>The does works on the form the does works on the form the does with x<sup>-1</sup>. <u>Add</u></li> <li>The does works on the form the the form</li></ul>						
$\frac{ \nabla \cos \psi_{1} ^{2}}{ \nabla \cos \psi_{2} ^{2}} = \frac{ \nabla \cos \psi_{2} ^{2}}{ \nabla \cos \psi_{2} ^{2}}} = \frac{ \nabla \cos \psi_{2} ^{2}}{ \nabla \cos \psi_{2} ^{2}}} = \frac{ \nabla \cos \psi_{2} ^{2}}{ \nabla \cos \psi_{2$						
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	7B 7-6 The Natural Bas	se, e	7B	7-7 Transform	ning Exponential and Log	arithmic Functions
Induction that $p = 1 + p_0^{-1}$ is the decay of neptonium-239, <u>Half of the isotope decays every 2.4 days</u> . 2. What do you need to determine? <u>Hew much of 100 grams of neptonium-239 remains after 20 days</u> . <b>A f(x) = 7^{-1} is translated 4 units left and stretched vertically by a factor of 5.</b> To translate a function 4 units horizontally to the left should you add or subtract 4 from x? <u>Add</u> $f(x) = \frac{7^{-1}}{10} = \frac{1}{100} + \frac{1}{1000} = \frac{1}{10000} = \frac{1}{10000000000000000000000000000000000$	7B 7-6 The Natural Bas The half-life of a substance is the time	e it takes for half of the substance to break	7B	7-7 Transform	ning Exponential and Log	arithmic Functions
<b>Understand the Problem</b> 1. Describe the decay of neptrinium-239. <u>Half of the isotope decays every 2.4 days</u> . <b>What</b> do you need to determine? <u>How much of 100 grams of neptrinium-239 remains after 20 days</u> . <b>Make a Plan</b> <b>a.</b> Find the decay constant, k, for neptrinium-239. Remember that half of the initial quantity will remain after 2.4 days. $M(t) - N_{0}e^{-t}$ $M(t) - N_{0}e^{-t}$ $M(t) = 1 e^{-t C                                   $	<b>7B 7-6 The Natural Bas</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope	<b>Be, e</b> it takes for half of the substance to break during the process of decay. has a half-life of 2.4 days. Use the decay	7B Find Voc	7-7 Transform these vocabulary word abulary	ning Exponential and Loga ds in Lesson 7-7 and the Multilingu	arithmic Functions
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<b>3.</b> Find the decay constant, k, for neptunium-239. Remember that half of the initial quantity will remain after 2.4 days. $M(t) = N_0 e^{-kt}$ $\boxed{1}_{0} = \boxed{1}_{0} e^{-kt} (\boxed{2}_{0})$ Substitute 1 for $N_0$ , 2.4 for t, and $\frac{1}{2}$ for $N(t)$ . $\ln \boxed{0.5}_{1-2.4} = k$ Simplify and take the natural log of both sides. $\ln \boxed{0.5}_{1-2.4} = k$ Simplify and isolate k. $k = \boxed{0.2888}$ Solve for k. Round to 4 decimal places. <b>Solve</b> <b>4.</b> Write the decay function using your value for k and solve for $N(t)$ . $M(t) = N_0 e^{-kt}$ $M(t) = \boxed{100}_{0} e^{-\frac{2kt}{2}}$ Substitute 100 for $N_0$ , $\frac{20}{0}$ for t, and your value for k. $M(t) = \boxed{100}_{0} e^{-\frac{2kt}{2}}$ Substitute 100 for $N_0$ , $\frac{20}{0}$ for t, and your value for k. $M(t) = \boxed{100}_{0} e^{-\frac{2kt}{2}}$ Substitute 100 for $N_0$ , $\frac{20}{0}$ for t, and your value for k. $M(t) = \boxed{100}_{0} e^{-\frac{2kt}{2}}$ Substitute 100 for $N_0$ , $\frac{20}{0}$ for t, and your value for k. $M(t) = \boxed{00}_{0} e^{-kt}$ Solve for $N(t)$ . <b>Look Back</b> <b>5.</b> To check your solution, substitute your answers for $N(t)$ and k into the decay function. $M(t) = N_0 e^{-kt}$ $(31 = 100e^{-2aabast} \rightarrow t = \frac{20}{0}$ <b>5.</b> Do your answers for $N(t)$ and k into the decay function. $M(t) = N_0 e^{-kt}$ <b>6.</b> Do your answers for $N(t)$ and k result in t equaling 20 days? <u>Yes</u>	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-\kappa t}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium	e, e it takes for half of the substance to break during the process of decay. has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain 239. <u>Half of the isotope decays every</u>	ns Voc tran 2.4 days. A. f after 20 days. T	7-7 Transform           these vocabulary word           abulary           sformation           prime           ing Transformed Ex           (x) = 7 <sup>×</sup> is translated 4 to translate a function 4	ting Exponential and Loga ds in Lesson 7-7 and the Multilingu arent function ponential Functions I units left and stretched vertically units horizontally to the left should yo	arithmic Functions al Glossary. by a factor of 5.
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$\int_{-2.4}^{1} = k$ Simplify and isolate <i>k</i> . k = 0.2888 Solve for <i>k</i> . Round to 4 decimal places. Solve 4. Write the decay function using your value for <i>k</i> and solve for <i>N</i> ( <i>t</i> ). $N(t) = N_0 e^{-kt}$ $N(t) = \frac{100}{0.31} e^{-\frac{100}{0.2888}} e^{-kt}$ Solve for <i>N</i> ( <i>t</i> ). Substitute 100 for $N_0$ , $\frac{20}{0}$ for <i>t</i> , and your value for <i>k</i> . $N(t) = \frac{100}{0.31} e^{-\frac{100}{0.2888}} e^{-kt}$ Solve for <i>N</i> ( <i>t</i> ). Lock Back 5. To check your solution, substitute your answers for <i>N</i> ( <i>t</i> ) and <i>k</i> into the decay function. $N(t) = N_0 e^{-kt}$ $0.31 = 100e^{-0.2888t} \rightarrow t \approx \frac{20}{0}$ 6. Do your answers for <i>N</i> ( <i>t</i> ) and <i>k</i> result in <i>t</i> equaling 20 days? Yes	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\boxed{\frac{1}{2}} = \boxed{1} e^{-k[2.4]}$	Se, e it takes for half of the substance to break during the process of decay. has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain $L_{239}$ . Half of the isotope decays every How much of 100 grams of neptunium-239 remains eptunium-239. Remember that half of the initial Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ .	ns <b>Voc</b> tran <u>2.4 days.</u> after 20 days. after 4 days. f al f b. f t	<b>7-7 Transform</b> these vocabulary work abulary sformation pr <b>ing Transformed Ex</b> (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? Add (x) = $7^{\frac{x}{2}}$ (x) = $7^{\frac{x}{2}}$ (x) = $5 \cdot 7^{\frac{x+4}{2}}$ (x) = $5 \cdot 7^{\frac{x+4}{2}}$ (x) = 11 <sup>x</sup> is horizontal he y-axis.	A compressed by a factor of $\frac{1}{4}$ and	by a factor of 5. au add or au add or au with x + 4. by 5. a reflected across
$\frac{-2.4}{k \approx 0.2888}$ Solve for <i>k</i> . Round to 4 decimal places. Solve 4. Write the decay function using your value for <i>k</i> and solve for <i>N</i> ( <i>t</i> ). $\frac{N(t) = N_0 e^{-kt}}{N(t) \approx 0.31}$ Solve for <i>N</i> ( <i>t</i> ). Substitute 100 for $N_0$ , $\frac{20}{20}$ for <i>t</i> , and your value for <i>k</i> . $\frac{N(t) \approx 0.31}{100e^{-kt}}$ Substitute your answers for <i>N</i> ( <i>t</i> ) and <i>k</i> into the decay function. $\frac{N(t) = N_0 e^{-kt}}{0.31 = 100e^{-kt}} = \frac{20}{100}$ 6. Do your answers for <i>N</i> ( <i>t</i> ) and <i>k</i> result in <i>t</i> equaling 20 days? Yes	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\boxed{\frac{1}{2}} = \boxed{1} e^{-k[2.4]}$ $\ln \boxed{\frac{1}{2}} = \boxed{1} e^{-k[2.4]}$	Se, e it takes for half of the substance to break during the process of decay. has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain 239. Half of the isotope decays every How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid	ns Voc tran 2.4 days. A. f after 20 days. T al f es. T	<b>7-7 Transform</b> these vocabulary word abulary sformation p <b>ing Transformed Ex</b> (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? Add (x) = $7^{x}$ (x) = $7^{x}$ (x) = $5 \cdot 7^{x+4}$ (x) = $5 \cdot 7^{x+4}$ (x) = 11 <sup>x</sup> is horizontal he y-axis. to reflect a function acro	A compressed by a factor of $\frac{1}{4}$ and	arithmic Functions al Glossary. by a factor of 5. nu add or unction. x with x + 4. by 5. I reflected across
<b>Solve</b> <b>4.</b> Write the decay function using your value for k and solve for N(t). $N(t) = N_0 e^{-xt}$ $N(t) = \boxed{100} e^{-\frac{1}{0.28881(20)}}$ Substitute 100 for N <sub>0</sub> , $20$ for t, and your value for k. $N(t) \approx \boxed{0.31}$ Solve for N(t). <b>Look Back</b> <b>5.</b> To check your solution, substitute your answers for N(t) and k into the decay function. $N(t) = N_0 e^{-xt}$ $0.31 = 100e^{-0.2888t} \rightarrow t \approx 20$ <b>6.</b> Do your answers for N(t) and k result in t equaling 20 days? Yes	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, <i>k</i> , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\boxed{\frac{1}{2}} = \boxed{1} e^{-k[\frac{2}{4}]}$ $\ln \boxed{\frac{1}{2}} = \boxed{1} e^{-k[\frac{2}{4}]}$ $\ln \boxed{\frac{1}{2}} = \boxed{-2.4}$ kln <i>e</i>	Se, e it takes for half of the substance to break during the process of decay. has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain 239. Half of the isotope decays every How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid	al find 15 15 15 15 15 15 15 15 15 15	7-7 Transform         these vocabulary word         abulary         sformation       p         ing Transformed Ex         (x) = 7 <sup>x</sup> is translated 4         to translate a function 4         ubtract 4 from x?         Add         (x) = $7^{\frac{x}{x+4}}$ (x) = $5 \cdot 7^{\frac{x+4}{x+4}}$ (x) = 11 <sup>x</sup> is horizontal he y-axis.         to reflect a function acroox         xponent?       Exponent	<b>Start by identifying the parent function</b> Start by identifying the parent function  Start by identifying the pa	by a factor of 5. au add or u add or unction. x with $x + 4$ . by 5. I reflected across sign on the coefficient or the
Solve 4. Write the decay function using your value for k and solve for N(t). $N(t) = N_0 e^{-kt}$ $N(t) = \frac{100}{0.3888/200}$ Substitute 100 for $N_0$ , $\frac{20}{20}$ for t, and your value for k. $N(t) = \frac{100}{0.31}$ Solve for N(t). <b>Lock Back</b> 5. To check your solution, substitute your answers for N(t) and k into the decay function. $N(t) = N_0 e^{-kt}$ $0.31 = 100e^{-0.2888t} \rightarrow t \approx \frac{20}{20}$ 6. Do your answers for N(t) and k result in t equaling 20 days? Yes	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, <i>k</i> , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\boxed{\frac{1}{2}} = \boxed{1} e^{-k[\frac{2}{3}]}$ $\ln \boxed{\frac{1}{2}} = \boxed{1} e^{-k[\frac{2}{3}]}$ $\ln \boxed{\frac{1}{2}} = \boxed{-2,4}$ kln <i>e</i>	<b>Be, e</b> it takes for half of the substance to break during the process of decay. has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain 239. <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains uptunium-239. Remember that half of the initial Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms.	Ans Find Voc tran 2.4 days. A. f after 20 days. T al f bes. T e f	7-7 Transform         these vocabulary word         abulary         sformation       p         ing Transformed Ex.         (x) = 7 <sup>x</sup> is translated x         to translate a function 4         ubtract 4 from x?         Addition (x) = 7 <sup>x</sup> (x) = 7 <sup>x</sup> (x) = 5       7 <sup>(x+4)</sup> (x) = 11 <sup>x</sup> is horizontal he yeaxis.         to reflect a function acro         xponent?         Exponent         (x) = 11 <sup>x</sup>	ting Exponential and Logic ds in Lesson 7-7 and the Multilingue arent function ponential Functions units left and stretched vertically units horizontally to the left should you Start by identifying the parent fu To translate 4 units left, replace Stretch vertically by multiplying ly compressed by a factor of 1/4 and ss the y-axis, should you change the Start by identifying the parent fu	arithmic Functions al Glossary. by a factor of 5. u add or unction. x with x + 4. by 5. I reflected across sign on the coefficient or the unction.
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$N(t) = \boxed{100}e^{-\frac{1000}{2888}(20)}$ Substitute 100 for $N_0$ , $20$ for t, and your value for k. $N(t) \approx \boxed{0.31}$ Solve for $N(t)$ . Look Back 5. To check your solution, substitute your answers for $N(t)$ and k into the decay function. $N(t) = N_0 e^{-kt}$ $0.31 = 100e^{-0.2888t} \rightarrow t \approx 20$ 6. Do your answers for $N(t)$ and k result in t equaling 20 days? Yes	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\frac{1}{2} = 1 e^{-k[2.4]}$ $\ln \frac{1}{2} = [n] e^{-k[2.4]}$ $\ln \frac{1}{2} = [n] e^{-k[2.4]}$ $\ln \frac{1}{2} = [n] e^{-k[2.4]}$ $\ln \frac{1}{2} = [n] e^{-k[2.4]}$ $\ln \frac{1}{2} = k$ $k \approx [0.2888]$	Se, e it takes for half of the substance to break during the process of decay. has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain 239. Half of the isotope decays every How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ .	ns <b>Variati</b> 2.4 days. after 20 days. al f tes. T tes. T twitte twitt	<b>7-7 Transform</b> these vocabulary work abulary sformation p <b>ing Transformed Ex.</b> (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? <u>Add</u> (x) = $7^{x}$ (x) = $7^{x}$ (x) = $5 \cdot 7^{x+4}$ (x) = 11 <sup>x</sup> is horizontal he y-axis. To reflect a function acroo xponent? <u>Exponent</u> (x) = $11^{\frac{1}{4x}}$ (x) = $11^{\frac{1}{4x}}$ (x) = $11^{\frac{1}{4x}}$ (x) = $11^{\frac{1}{4x}}$	A solution of the second seco	ail Glossary.         by a factor of 5.         by a datter of 5.         by 5.         I reflected across         sign on the coefficient or the         unction.         lying x by 4.         lacing x with $-x$ .
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<b>Lock Back</b> 5. To check your solution, substitute your answers for $N(t)$ and $k$ into the decay function. $N(t) = N_0 e^{-kt}$ $0.31 = 100e^{-0.2888t} \rightarrow t \approx 20$ 6. Do your answers for $N(t)$ and $k$ result in $t$ equaling 20 days? Yes $f(x) = \begin{bmatrix} \frac{1}{3} & \log_2 x - \frac{5}{5} & \text{To translate 5 units down, subtract 5 from the right side.} \\ F(x) = \begin{bmatrix} \frac{1}{3} & \log_2 x - \frac{5}{5} & \log_2 x - \log_2$	<b>7B 7-6 The Natural Base</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, <i>k</i> , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\boxed{\frac{1}{2}} = \boxed{1} e^{-k[\frac{2}{2}]}$ $\ln \frac{1}{2} = \boxed{1} e^{-k[\frac{2}{2}]}$ $\ln \frac{1}{2} = \boxed{-2.4}$ kln $e$ $\ln \boxed{0.5} = k$ $k \approx \boxed{0.2888}$ <b>Solve</b> <b>4.</b> Write the decay function using yo $N(t) = N_0 e^{-kt}$	<b>Be, e</b> <b>b</b> it takes for half of the substance to break during the process of decay. <b>h</b> as a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> _{239}. Half of the isotope decays every How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>c</b> _{100}. Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ .	ns <b>Variati</b> 2.4 days. after 20 days. al f tes. T tes. T tes. T tran	<b>7-7 Transform</b> these vocabulary work abulary sformation p <b>ing Transformed Ex</b> (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? <u>Add</u> (x) = $7^{x+4}$ (x) = $5 \cdot 7^{x+4}$ (x) = $5 \cdot 7^{x+4}$ (x) = $11^{x}$ is horizontal he y-axis. To reflect a function acro xponent? <u>Exponent</u> (x) = $11^{\frac{x}{2}}$ (x) = $11^{-\frac{x}{2}}$ (x) = $11^{-\frac{x}{2}}$ (x) = $11^{-\frac{x}{2}}$ ing Transformed Lo (x) = $\log_2 x$ is verticall to translate a function 5	<b>Start by identifying the parent function Start by identifying</b>	arithmic Functions Ial Glossary. by a factor of 5. In add or Inction. <i>x</i> with <i>x</i> + 4. by 5. I reflected across sign on the coefficient or the Inction. Ilying <i>x</i> by 4. Ialacing <i>x</i> with - <i>x</i> . translated 5 units down. ct 5 from <i>x</i> ? <u>Add</u>
<b>Look Back</b> 5. To check your solution, substitute your answers for $N(t)$ and $k$ into the decay function. $N(t) = N_0 e^{-kt}$ $0.31 = 100e^{-0.288kt} \rightarrow t \approx 20$ 6. Do your answers for $N(t)$ and $k$ result in $t$ equaling 20 days? Yes Yes $Reflect across the x-axis by multiplying the right side by the right of the right side by the right side by$	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\boxed{\frac{1}{2}} = \boxed{1} e^{-k[\frac{2}{2}, \frac{3}{2}]}$ $\ln \frac{1}{2} = \boxed{1} e^{-k[\frac{2}{2}, \frac{3}{2}]}$ $\ln \frac{1}{2} = \boxed{-2, 4}$ kin $e$ $\ln \boxed{0.5} = k$ $k \approx \boxed{0.2888}$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) = \boxed{100} e^{-\frac{50000}{20000000000000000000000000000000$	<b>Be, e</b> <b>b</b> it takes for half of the substance to break during the process of decay. <b>h</b> as a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> _{239}. Half of the isotope decays every How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>c</b> _{100}. Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ .	As a constant of the second se	<b>7-7 Transform</b> these vocabulary work abulary sformation p <b>ing Transformed Ex.</b> (x) = 7 <sup>x</sup> is translated a to translate a function 4 ubtract 4 from x? <u>Add</u> (x) = $7^{x}$ (x) = $7^{x+4}$ (x) = $5 \cdot 7^{x+4}$ (x) = 11 <sup>x</sup> is horizontal he y-axis. To reflect a function acro xponent? <u>Exponent</u> (x) = $11^{\frac{x}{4}}$ (x) = $11^{-\frac{x}{4}}$ <b>ing Transformed Lo</b> (x) = $\log_2 x$ is vertically to translate a function 5 (x) = $\boxed{\log_2 x}$	<b>Start by identifying the parent functions Start by identifyin</b>	by a factor of 5. In Glossary. by a factor of 5. In add or Inction. x with $x + 4$ . by 5. I reflected across sign on the coefficient or the Inction. Ilying $x$ by 4. Ialacing $x$ with $-x$ . translated 5 units down. ct 5 from $x$ ? <u>Add</u> Inction.
5. To check your solution, substitute your answers for $N(t)$ and $k$ into the decay function. $N(t) = N_0 e^{-kt}$ $0.31 = 100e^{-0.2888t} \rightarrow t \approx \frac{20}{20}$ 6. Do your answers for $N(t)$ and $k$ result in $t$ equaling 20 days? Yes $f(x) = \ln x$ is translated 1 unit right and reflected across the x-axis. $f(x) = \ln x$ is translated 1 unit right and reflected across the x-axis. $f(x) = \ln x$ Start by identifying the parent function. $f(x) = \ln (x - 1)$ To translate 1 unit right, replace x with $x - 1$ . $f(x) = -1 \ln (x - 1)$ Reflect across the x-axis by multiplying the right side by	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\boxed{\frac{1}{2}} = \boxed{1} e^{-k[\frac{2}{2}, \frac{3}{2}]}$ $\ln \frac{1}{2} = \boxed{1} e^{-k[\frac{2}{2}, \frac{3}{2}]}$ $\ln \frac{1}{2} = \boxed{-2, 4}$ kin $e$ $\ln \boxed{0.5} = k$ $k \approx \boxed{0.2888}$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) = \boxed{100} e^{-\frac{50000}{20000000000000000000000000000000$	<b>Be, e</b> <b>b</b> it takes for half of the substance to break during the process of decay. <b>b</b> , has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> _{239}. <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>c</b> . Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ . Substitute 100 for $N_0$ , <u>20</u> for $t$ , and your V	As a for the second sec	7-7 Transform         these vocabulary word         abulary         sformation       p         ing Transformed Ex         (x) = 7 <sup>x</sup> is translated 4         to translate a function 4         ubtract 4 from x?         Addition (x) = 7 <sup>x</sup> (x) = 5         (x) = 11 <sup>x</sup> is horizontal he y-axis.         to reflect a function acro         x(x) = 11 <sup>4x</sup> (x) = 10 <sup>4x</sup> (x) = log <sub>2x</sub> x is verticall         to translate a function 5         (x) = 10 <sup>4x</sup> / <sub>2x</sub> (x) = 10 <sup>4x</sup> / <sub>2x</sub>	<b>Start by identifying the parent function Start by identifying the parent functions Start by identifying the parent function Start by identifyin</b>	by a factor of 5. we add or anction. <i>x</i> with <i>x</i> + 4. by 5. I reflected across sign on the coefficient or the inction. I/ying <i>x</i> by 4. lacing <i>x</i> with $-x$ . <b>translated 5 units down.</b> ct 5 from <i>x</i> ? <u>Add</u> inction. Ing the right side by $\frac{1}{3}$ .
$N(t) = N_0 e^{-kt}$ $0.31 = 100 e^{-0.2888t} \rightarrow t \approx \frac{20}{1000}$ 6. Do your answers for $N(t)$ and $k$ result in $t$ equaling 20 days? Yes $f(x) = \frac{  x }{1000}$ Start by identifying the parent function. $f(x) = \ln(\frac{ x-1 }{1000})$ To translate 1 unit right, replace $x$ with $x - 1$ . $f(x) = \frac{  x }{10000}$ Reflect across the $x$ -axis by multiplying the right side by	<b>7B 7-6 The Natural Base</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ner quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\frac{1}{2} = 1 e^{-k[2.3]}$ $\ln \frac{1}{2} = 1 e^{-k[2.3]}$ $\ln \frac{1}{2} = -2.4$ k/n $e$ $\ln 0.5$ -2.4 = k $k \approx 0.28888$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) = 100 e^{-(0.2008)(20)}$ $N(t) \approx 0.31$	<b>Be, e</b> <b>b</b> it takes for half of the substance to break during the process of decay. <b>b</b> , has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> _{239}. <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>c</b> . Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ . Substitute 100 for $N_0$ , <u>20</u> for $t$ , and your V	As a for the second sec	7-7 Transform         these vocabulary word         abulary         sformation       p         ing Transformed Ex         (x) = 7 <sup>x</sup> is translated 4         to translate a function 4         ubtract 4 from x?         Addition (x) = 7 <sup>x</sup> (x) = 5         (x) = 11 <sup>x</sup> is horizontal he y-axis.         to reflect a function acro         x(x) = 11 <sup>4x</sup> (x) = 10 <sup>4x</sup> (x) = log <sub>2x</sub> x is verticall         to translate a function 5         (x) = 10 <sup>4x</sup> / <sub>2x</sub> (x) = 10 <sup>4x</sup> / <sub>2x</sub>	<b>Start by identifying the parent function Start by identifying the parent functions Start by identifying the parent function Start by identifyin</b>	by a factor of 5. we add or anction. <i>x</i> with <i>x</i> + 4. by 5. I reflected across sign on the coefficient or the inction. I/ying <i>x</i> by 4. lacing <i>x</i> with $-x$ . <b>translated 5 units down.</b> ct 5 from <i>x</i> ? <u>Add</u> inction. Ing the right side by $\frac{1}{3}$ .
$0.31 = 100e^{-0.288kt} \rightarrow t \approx \underline{20}$ 6. Do your answers for <i>N</i> ( <i>t</i> ) and <i>k</i> result in <i>t</i> equaling 20 days? Yes $f(x) = \ln(\underline{x-1})$ To translate 1 unit right, replace <i>x</i> with <i>x</i> - 1. $f(x) = \boxed{-1} \ln(\underline{x-1})$ Reflect across the <i>x</i> -axis by multiplying the right side by	<b>7B 7-6 The Natural Base</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ner quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\frac{1}{2} = 1 e^{-k[2.3]}$ $\ln \frac{1}{2} = 1 e^{-k[2.3]}$ $\ln \frac{1}{2} = -2.4$ k/ln $e^{-ln}$ $\ln 0.5$ -2.4 = k $k \approx 0.28888$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) \approx 0.31$ <b>Look Back</b>	<b>Be, e</b> <b>b</b> it takes for half of the substance to break during the process of decay. <b>c</b> , has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> <sub>239</sub> . <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>c</b> substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ . Substitute 100 for $N_0$ , <u>20</u> for $t$ , and your v Solve for $N(t)$ .	Ans Prind Pr	<b>7-7 Transform</b> these vocabulary work abulary sformation p <b>ing Transformed Ex</b> (x) = 7 <sup>x</sup> is translated x o translate a function 4 ubtract 4 from x? <u>Add</u> (x) = $7^{x}$ (x) = $5 \cdot 7^{x+4}$ (x) = $5 \cdot 7^{x+4}$ (x) = $1^{x}$ is horizontal he y-axis. o reflect a function acro xponent? <u>Exponent</u> (x) = $11^{x}$ (x) = $11^{4x}$ (x) = $11^{4x}$ (x) = $11^{4x}$ (x) = $11^{4x}$ (x) = $11^{4x}$ (x) = $11^{4x}$ (x) = $10g_{2}x$ (x) = $\frac{3}{3}\log_{2}x$ (x) = $\frac{1}{3}\log_{2}x - \frac{5}{3}$	<b>Start by identifying the parent functions Start by identifying the parent functions Start by identifying the parent function Start by identifying the parent functionally compressed by a factor of <math>\frac{1}{4}</math> and <b>Start by identifying the parent functionally compressed by a factor of <math>\frac{1}{3}</math> and units down, should you add or subtra Start by identifying the parent functionally compress by multiplying in the compress by multiplying in the start by identifying the parent function Start b</b></b>	by a factor of 5. In Glossary. by a factor of 5. In add or anction. x with $x + 4$ . by 5. I reflected across sign on the coefficient or the anction. Ilying $x$ by 4. lacing $x$ with $-x$ . translated 5 units down. act 5 from $x$ ? Add inction. Ing the right side. State of the right side.
6. Do your answers for $N(t)$ and $k$ result in $t$ equaling 20 days? Yes $f(x) = [-1] \ln (x - 1)$ Reflect across the x-axis by multiplying the right side by	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\frac{1}{2} = 1 e^{-k[2.3]}$ $\ln \frac{1}{2} = [-2.4] k \ln e$ $\ln \frac{0.5}{2} = k$ $k \approx 0.2888$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) = \frac{100}{200} e^{-52888}(200)$ <b>5.</b> To check your solution, substitute	<b>Be, e</b> <b>b</b> it takes for half of the substance to break during the process of decay. <b>c</b> , has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> <sub>239</sub> . <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>c</b> substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ . Substitute 100 for $N_0$ , <u>20</u> for $t$ , and your v Solve for $N(t)$ .	7B           is         Find           Voc         tran           atter 20 days.         A. f           atter 20 days.         T           al         f           f         f           tes.         T           value for k.         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f	<b>7-7 Transform</b> these vocabulary work abulary sformation p <b>ing Transformed Ex</b> (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? Add (x) = $7^{x}$ (x) = $5 \cdot 7^{[x+4]}$ (x) = $5 \cdot 7^{[x+4]}$ (x) = $11^{x}$ is horizontal he y-axis. To reflect a function acro xponent? Exponent (x) = $11^{x}$ (x)	<b>Start by identifying the parent function Start by identifying the parent functions Start by identifying the parent function Start by identifying the parent functionally compressed by a factor of 1/4 and start by identifying the parent functionally compressed by a factor of 1/3 and units down, should you add or subtra Start by identifying the parent functions is units down, should you add or subtra Start by identifying the parent function function Start by identifying the parent functions Start by identifying the parent functionally compress by multiplying</b> To translate 5 units down, subtra 1 <b>Start by identifying the parent functionally compress by multiplying</b>	by a factor of 5. In Glossary. by a factor of 5. In add or Inction. x with $x + 4$ . by 5. In reflected across sign on the coefficient or the Inction. Ilying $x$ by 4. Ialacing $x$ with $-x$ . translated 5 units down. act 5 from $x$ ? <u>Add</u> Inction. Ing the right side by $\frac{1}{3}$ . Cat 5 from the right side. The <b>x</b> -axis.
	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-Kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\frac{1}{2} = 1 e^{-k[2.4]}$ $\ln \frac{1}{2} = 1 e^{-k[2.4]}$ $\ln \frac{1}{2} = -2.4$ kln $e$ $\ln 0.5$ = k $k \approx 0.2888$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) = 100 e^{-kt}$ $N(t) \approx 0.31$ <b>Look Back</b> <b>5.</b> To check your solution, substitute $N(t) = N_0 e^{-kt}$	<b>Be, e</b> <b>b</b> it takes for half of the substance to break during the process of decay. <b>c</b> , has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> <sub>239</sub> . <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>c</b> substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isolate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ . Substitute 100 for $N_0$ , <u>20</u> for $t$ , and your v Solve for $N(t)$ .	7B           is         Find           Voc         tran           atter 20 days.         A. f           atter 20 days.         T           al         f           f         f           tes.         T           value for k.         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f           f         f	<b>7-7 Transform</b> these vocabulary work abulary sformation p <b>ing Transformed Ex</b> (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? Add (x) = $7^{x}$ (x) = $5 \cdot 7^{[x+4]}$ (x) = $5 \cdot 7^{[x+4]}$ (x) = $11^{x}$ is horizontal he y-axis. To reflect a function acro xponent? Exponent (x) = $11^{x}$ (x)	<b>Start by identifying the parent functions Start by identifying the parent functions Start by identifying the parent function Start by identifying the parent functions Start Functions Y compressed by a factor of 1/3 and units down</b> , should you add or subtra <b>Start by identifying the parent functions Y compressed by a factor of 1/3 and UN compressed by a factor of 1/3 and Start by identifying the parent functions Y compressed by a factor of 1/3 and UN compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress by multiplying To translate 5 units down</b> , subtra <b>Start by identifying the parent functionally compress b</b>	by a factor of 5. In all Glossary. by a factor of 5. In add or anction. x with $x + 4$ . by 5. In reflected across sign on the coefficient or the anction. If ying $x$ by 4. Ialacing $x$ with $-x$ . translated 5 units down. act 5 from $x$ ? <u>Add</u> Inction. Ing the right side by $\frac{1}{3}$ . act 5 from the right side. The $x$ -axis. Inction.
Copyright O by Holt, Rinehart and Winston. 120 Holt Algebra 2 Copyright O by Holt, Rinehart and Winston. 121 Holt Alg	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\frac{1}{2} = 1 e^{-k[2:4]}$ $\ln \frac{1}{2} = 1 e^{-k[2:4]}$ $\ln \frac{1}{2} = -2.4$ kln $e$ $\ln 0.5$ = k $k \approx 0.2888$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) \approx 0.31$ <b>Look Back</b> <b>5.</b> To check your solution, substitute $N(t) = N_0 e^{-kt}$ $0.31 = 100 e^{-0.2888t} \rightarrow t \approx 20$	<b>Be, e</b> <b>a</b> it takes for half of the substance to break during the process of decay. <b>b</b> , has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> _239. <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>b</b> . Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isotate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ . Substitute 100 for $N_0$ , <u>20</u> for $t$ , and your of Solve for $N(t)$ .	7B       Find       Voc       tran       2.4 days.       A. f       after 20 days.       al       f       des.       r       value for k.       f       f       unction.       B. f       f	<b>7-7 Transform</b> these vocabulary work abulary sformation p ing Transformed Ex (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? Add (x) = $7^{x}$ (x) = $7^{x}$ (x) = $5 \cdot 7^{x+4}$ (x) = $5 \cdot 7^{x+4}$ (x) = $11^{x}$ is horizontal he y-axis. To reflect a function acro xponent? Exponent (x) = $11^{x}$ (x) = $11^{$	<b>Start by identifying the parent functions Start by identifying the parent functions Start by identifying the parent function Start by identifying the parent functions Start by identifying the parent function Start by iden</b>	by a factor of 5. In all Glossary. by a factor of 5. In add or anction. <i>x</i> with <i>x</i> + 4. by 5. In reflected across sign on the coefficient or the anction. If ying <i>x</i> by 4. Ialacing <i>x</i> with $-x$ . translated 5 units down. act 5 from <i>x</i> ? <u>Add</u> Inction. Ing the right side by $\frac{1}{3}$ . Compared to the right side. The <i>x</i> -axis. Inction. <i>x</i> with <i>x</i> - 1.
Copyright 0 by Holt, Rinehart and Winston. 120 Holt Algebra 2 Copyright 0 by Holt, Rinehart and Winston. 121 Holt Alg	<b>7B 7-6 The Natural Bass</b> The half-life of a substance is the time down or convert to another substance Neptunium-239, a radioactive isotope function $N(t) = N_0 e^{-kt}$ to determine the after 20 days. <b>Understand the Problem</b> <b>1.</b> Describe the decay of neptunium <b>2.</b> What do you need to determine? <b>Make a Plan</b> <b>3.</b> Find the decay constant, $k$ , for ne quantity will remain after 2.4 days $N(t) = N_0 e^{-kt}$ $\frac{1}{2} = 1 e^{-k[2:4]}$ $\ln \frac{1}{2} = 1 e^{-k[2:4]}$ $\ln \frac{1}{2} = -2.4$ kln $e$ $\ln 0.5$ = k $k \approx 0.2888$ <b>Solve</b> <b>4.</b> Write the decay function using you $N(t) = N_0 e^{-kt}$ $N(t) \approx 0.31$ <b>Look Back</b> <b>5.</b> To check your solution, substitute $N(t) = N_0 e^{-kt}$ $0.31 = 100 e^{-0.2888t} \rightarrow t \approx 20$	<b>Be, e</b> <b>a</b> it takes for half of the substance to break during the process of decay. <b>b</b> , has a half-life of 2.4 days. Use the decay he amount of a 100-gram sample that remain <b>c</b> _239. <u>Half of the isotope decays every</u> How much of 100 grams of neptunium-239 remains ptunium-239. Remember that half of the initial <b>b</b> . Substitute 1 for $N_0$ , 2.4 for $t$ , and $\frac{1}{2}$ for $N(t)$ . Simplify and take the natural log of both sid Apply the Power Property of Logarithms. Simplify and isotate $k$ . Solve for $k$ . Round to 4 decimal places. ur value for $k$ and solve for $N(t)$ . Substitute 100 for $N_0$ , <u>20</u> for $t$ , and your of Solve for $N(t)$ .	7B       Find       Voc       tran       2.4 days.       A. f       after 20 days.       al       f       des.       r       value for k.       f       f       unction.       B. f       f	<b>7-7 Transform</b> these vocabulary work abulary sformation p ing Transformed Ex (x) = 7 <sup>x</sup> is translated 4 to translate a function 4 ubtract 4 from x? Add (x) = $7^{x}$ (x) = $7^{x}$ (x) = $5 \cdot 7^{x+4}$ (x) = $5 \cdot 7^{x+4}$ (x) = $11^{x}$ is horizontal he y-axis. To reflect a function acro xponent? Exponent (x) = $11^{x}$ (x) = $11^{$	<b>Start by identifying the parent functions Start by identifying the parent functions Start by identifying the parent function Start by identifying the parent functions Start by identifying the parent function Start by iden</b>	by a factor of 5. In all Glossary. by a factor of 5. In add or anction. <i>x</i> with <i>x</i> + 4. by 5. In reflected across sign on the coefficient or the anction. If ying <i>x</i> by 4. Ialacing <i>x</i> with $-x$ . translated 5 units down. act 5 from <i>x</i> ? <u>Add</u> Inction. Ing the right side by $\frac{1}{3}$ . Compared to the right side. The <i>x</i> -axis. Inction. <i>x</i> with <i>x</i> - 1.
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SECTION Ready To Go On? Skills Intervention	section Ready To Go On? Quiz
7-8 Curve Fitting with Exponential and Logarithmic Models Find this vocabulary word in Lesson 7-8 and the	78
Multilingual Glossary.	7-5 Exponential and Logarithmic Equations and Inequalities Solve.
exponential Data	<b>1.</b> $81 = 3^{x-4}$ <b>2.</b> $\log_4(x-6) = 3$
A. Determine whether <i>f</i> is an exponential function of <i>x</i> . If so, find the constant ratio.	x = 8 x = 70
x -1 0 1 2 3 4	<b>3.</b> $900 = 5^{x-1}$ <b>4.</b> $\log 50x - \log 2 = 3$
$f(x) = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81}$	$x \approx 5.23 \qquad \qquad x = 40$
For linear functions, first differences are constant.	5. A lottery winner can choose a prize of either \$500,000 or one penny
For exponential functions, the <u>ratio</u> of each <i>y</i> -value and the previous value is constant.	on the first day, quadruple that (4 cents) on the second day, and so on for 30 days. On what day would the lottery winner receive more than
Using the table of values:	the original \$500,000 prize? Day 14
a. Find the first differences.	7-6 The Natural Base, e
$+\frac{2}{3}$ ; +2; +6; +18; +54	6. Graph $f(x) = 2 - e^x$ . 7. Graph $f(x) = e^x + \frac{1}{2}$ .
b. Find the ratios of the $f(x)$ terms.	
3; 3; 3; 3; 3	
Is the function linear or exponential?Exponential	
If the function is exponential, what is the constant ratio?3	
Use linear or exponential regression to find a function that models the data. $f(\mathbf{x}) = -3^{x}$	
$f(x) = \_\_\_$ B. Determine whether <i>f</i> is an exponential function of <i>x</i> . If so, find the constant ratio.	Simplify.
<b>b.</b> Determine whether its an exponential function of $x$ it so, and the constant ratio. x -1  0  1  2  3  4	8. $\ln e^{\frac{1}{3}}$ 9. $e^{\ln(2x+1)}$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{1}{3}$ $2x + 1$
Using the table of values:	<b>10.</b> $e^{7\ln x}$ <b>11.</b> $\ln e^{x + 12y}$
a. Find the first differences.	$x^7$ $x + 12y$
+2.5; +2.5; +2.5; +2.5; +2.5	12. lne <sup>0.7</sup> 13. lne <sup>-0.6x</sup>
b. Find the ratios of the $f(x)$ terms.	
-0.67; 3.5; 1.7; 1.42; 1.29	<u> </u>
Is the function linear or exponential? <u>LINEAR</u> If the function is exponential, what is the constant ratio? <u>Not applicable</u>	14. What is the total amount after 5 years for an investment of \$2000 invested at 4% compounded continuously? \$2442.81
Use linear or exponential regression to find a function that models the data.	invested at 4% compounded continuously? $32442.81$ <b>15.</b> Use the decay function $N_t = N_0 e^{-kt}$ to determine how much of
$f(x) = \frac{2.5x}{1} + \frac{1}{1}$	20 grams of carbon-14 will remain after 500 years. Carbon-14's
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SECTION Ready To Go On? Quiz continued	Ready To Go On? Enrichment
78	Ready To Go On? Enrichment           76           Compounding Continuously
7B 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe	7B Compounding Continuously When investing money at a compounded interest rate, the interest is paid on the
7B 7-7 Transforming Exponential and Logarithmic Functions	7B Compounding Continuously When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula:
7B 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function.	<b>7B</b> <b>Compounding Continuously</b> When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{f}{n})^{nt}$
7B 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function.	7B Compounding Continuously When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula:
7B 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function.	<b>7B</b> <b>Compounding Continuously</b> When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{T}{n})^{nt}$ As <i>n</i> increases, the interest approaches that of <i>continuously</i> compounded interest.
7B 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function.	<b>7B</b> <b>Compounding Continuously</b> When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{n})^{nt}$ As <i>n</i> increases, the interest approaches that of <i>continuously</i> compounded interest. The formula for <i>continuously</i> compounded interest is:
7B 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function.	<b>7B</b> <b>Compounding Continuously</b> When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{f}{n})^{nt}$ As <i>n</i> increases, the interest approaches that of <i>continuously</i> compounded interest. The formula for <i>continuously</i> compounded interest is: $A = Pe^{rt}$
7B 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function.	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{T}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{nt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Principal       Rate       Time in       Compound       Amount
7.7 Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 5  y -5  y -5  y -5  y -5  y	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{R})^{rt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table. <b>Principal Rate Time in</b> (P)       (r) <b>years (t) Interval (n)</b>
7.7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 19. $\int \frac{5}{4} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 12. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 13. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 14. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 15. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 18. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 12. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 13. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 14. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 15. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 16. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 17. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 18. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 12. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 13. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 14. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 15. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 16. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 17. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 17. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 18. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19.	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{T}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Irricipal Rate Time in Compound (n)         Amount (n)         (A)         Semi-annually \$3277.23         n = 2
7.7 Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 5 A y -5 y-intercept: $0$ asymptote: $x = -1$ y = -2	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Interval (n) $(P)$ $(r)$ $years(t)$ $(P)$
7.7 Transforming Exponential and Logarithmic Functions Graph the function. Find the <i>y</i> -intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 19. $\int \frac{5}{4} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 12. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 13. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 14. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 15. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 18. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 12. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 13. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 14. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 15. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 16. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 17. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 18. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 10. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 11. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 12. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 13. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 14. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 15. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 16. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 17. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 17. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 18. $\int \frac{5}{-5} \sqrt{\frac{5}{-5}}$ 19.	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Immet in Compound Amount (P)         Q2000       5%       10       Semi-annually       \$3277.23         2000       5%       10       Quarterly       \$3287.24         2000       5%       10       Monthly       \$3294.02
7.7 Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 5.4 y -5 y y-intercept: 0 asymptote: x = -1 transformation: Shifted one unit left; y-intercept: 0 asymptote: y = -2 transformation: Shifted 2 units down;	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the original principal and on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table. $\frac{Principal}{(r)}$ Rate       Time in       Compound       Amount $\frac{(P)}{2000}$ 5%       10       Semi-annually       \$3277.23 $2000$ 5%       10       Quarterly       \$3287.24 $2000$ 5%       10       Monthly       \$3294.02 $2000$ 5%       10       Dally       \$3297.33
78 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 5. $y$ y-intercept: 0 asymptote: $x = -1$ transformation: Shifted one unit left; reflected across x-axis y-intercept: 0 asymptote: $y = -2$ transformation: Shifted one unit left; reflected across x-axis	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Immetin in Compound Amount (P)         (P)       2000       5%       10       Semi-annually       \$3277.23         2000       5%       10       Monthly       \$3287.24       1         2000       5%       10       Monthly       \$3294.02       1         2000       5%       10       Daily       \$3297.33       1
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778 7-7 Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. 16. $g(x) = -\log(x + 1)$ 17. $h(x) = e^{\frac{x}{2}} - 2$ 5 <b>A</b> <i>y</i> -5 <b>y</b> <i>y</i> -intercept: <u>0</u> asymptote: <u>x = -1</u> transformation: Shifted one unit left; reflected across <i>x</i> -axis Write the transformed function. 18. $f(x) = 5^x$ is vertically stretched by 4 and reflected across the <i>y</i> -axis. $f(x) = 4(5^{-x})$	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Immetin in Compound Amount (P)         (P)       2000       5%       10       Semi-annually       \$3277.23         2000       5%       10       Monthly       \$3287.24       1         2000       5%       10       Monthly       \$3294.02       1         2000       5%       10       Daily       \$3297.33       1
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<b>7B</b> <b>7-7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(12x) + 1$ <b>7.8 Curve Fitting with Exponential and Logarithmic Models</b> <b>Determine whether y is an exponential function of x. If so, find the constant</b>	78         Compounding Continuously         When investing money at a compounded interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{R})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Immedia Mate Time in Compound Amount (P) years (t) Interval (n) (A) years (t) a - 2         2000 5% 10 Cuarterly \$3287.24         2000 5% 10 Daily \$3297.33         2000 5% 10 Continuously \$3297.34         2000 5% 10 Continuously \$3297.34         2. Which interval earms more money for an investment? Compounding continuously compounded interval earms more money for an investment?         Compou
<b>7B</b> <b>7-7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(12x) + 1$ <b>7.8 Curve Fitting with Exponential and Logarithmic Models</b> Determine whether y is an exponential function of x. If so, find the constant ratio and use exponential regression to find a function that models the data.	78         Compounding Continuously         When investing money at a compounded interest rate, the interest is paid on the accumulated interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{T}{R})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Principal Rate Time in Compound Amount         (P)       (P) <t< th=""></t<>
<b>7B</b> <b>7-7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(12x) + 1$ <b>7.8 Curve Fitting with Exponential and Logarithmic Models</b> <b>Determine whether y is an exponential function of x. If so, find the constant</b>	78         Compounding Continuously         When investing money at a compounded interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{r}{R})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         I. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Immedia Mate Time in Compound Amount (P) years (t) Interval (n) (A) years (t) a - 2         2000 5% 10 Cuarterly \$3287.24         2000 5% 10 Daily \$3297.33         2000 5% 10 Continuously \$3297.34         2000 5% 10 Continuously \$3297.34         2. Which interval earms more money for an investment? Compounding continuously compounded interval earms more money for an investment?         Compou
<b>7.8</b> <b>7.7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = x - 2$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = \ln(12x) + 1$ <b>18.</b> $f(x) = \frac{1}{2} \frac{2}{18} \frac{4}{162} \frac{5}{486}$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>11.</b> $\overline{x - 2 - 1}$ 0 1 2 3	78         Compounding Continuously         When investing money at a compounded interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{T}{P})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Image: Pe <sup>rt</sup> Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Image: Principal Rate Time in Compound Amount (P) (r) years (t) Interval (n) (A)         2000 5% 10 Cuarterly \$32297.23         2000 5% 10 Cuarterly \$32294.02         2000 5% 10 Continuously \$3297.33         2000 5% 10 Continuously \$3297.44         2. Which interval earns more money for an investment? Compounding continuously         Answer each of the following questions.         3. How long will it take an investment of \$1000 to triple in value if it is invested at a rate of 8% compounded monthly?         I = 13.73 years <td< th=""></td<>
<b>7B</b> <b>7-7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{5}{5}} - 2$ <b>5</b> $\frac{4y}{-5}$ <b>17.</b> $h(x) = e^{\frac{5}{5}} - 2$ <b>17.</b> $h(x) = e^{\frac{5}{5}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. $f(x) = \ln(12x) + 1$ <b>7-8 Curve Fitting with Exponential and Logarithmic Models</b> Determine whether y is an exponential function of x. If so, find the constant ratio and use exponential regression to find a function that models the data. <b>20.</b> $\frac{x}{\frac{1}{y}} \frac{1}{2} \frac{1}{6} \frac{1}{18} \frac{5}{54} \frac{1}{162} \frac{5}{486}$ <b>Yes; constant ratio:</b> 3; $f(x) = 2(3^x)$	78         Compounding Continuously         Men investing money at a compounded interest. Recall that compound interest is computed using the formula: $A = P(1 + \frac{\pi}{n})^{nt}$ As n increases, the interest approaches that of continuously compounded interest. The formula for continuously compounded interest is: $A = Pe^{rt}$ Compare compound interest intervals by completing the table.         1. Emmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table.         Immet invests \$2000 for 10 years at a 5% compound a mount $(P)$ $(P)$ Output the principal Rate Time in Compound Amount $(P)$
<b>7.8</b> <b>7.7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = x - 2$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = \ln(12x) + 1$ <b>18.</b> $f(x) = \frac{1}{2} \frac{2}{18} \frac{4}{162} \frac{5}{486}$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>11.</b> $\overline{x - 2 - 1}$ 0 1 2 3	<b>Provide a set of the following questions:</b> Which interval earns more money for an investment? Compounding continuously <b>Compounding continuously</b> <b>Compare act of the following questions.</b> <b>Compare act of the following questions.</b> <b>Compare compound interest intervals by completing the table.</b> <b>1.</b> Ermmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table. <b>1.</b> Ermmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table. <b>1.</b> Ermmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table. <b>1.</b> Ermmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table. <b>1.</b> Ermmett invests \$2000 for 10 years at a 5% compounded interest rate. Complete the table. <b>1.</b> Ermmett invests \$2000 for 10 years (t) Interval (n) (A) <b>2000</b> 5% 10 Continuously \$3297.23 <b>2000</b> 5% 10 Quarterity \$3287.24 <b>2000</b> 5% 10 Daily \$3297.33 <b>2000</b> 5% 10 Continuously \$3297.33 <b>2000</b> 5% 10 Continuously \$3297.44 <b>2.</b> Which interval earns more money for an investment? <b>Compounding continuously</b> <b>Answer each of the following questions.</b> <b>3.</b> How long will it take an investment of \$1000 to triple in value if it is invested at a rate of 8% compounded continuously? <b>1</b> ~ <b>13</b> .73 <b>years</b> <b>4.</b> How long will it take an investment of \$2500 to double in value if it is invested at a rate of 6% compounded continuously? <b>1</b> ~ <b>11.55 years</b> <b>5.</b> Carolyn has \$6825.70 in her savings account. She invested her money at a 4% interest rate for 5 years compounded continuously. How much did she
<b>7.8</b> <b>7.7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = x - 2$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = \ln(12x) + 1$ <b>18.</b> $f(x) = \frac{1}{2} \frac{2}{18} \frac{4}{162} \frac{5}{486}$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>11.</b> $\overline{x - 2 - 1}$ 0 1 2 3	<b>The set of the set o</b>
<b>7.8</b> <b>7.7</b> Transforming Exponential and Logarithmic Functions Graph the function. Find the y-intercept and asymptote. Describe how the graph is transformed from the graph of the parent function. <b>16.</b> $g(x) = -\log(x + 1)$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>17.</b> $h(x) = e^{\frac{x}{2}} - 2$ <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>18.</b> $f(x) = 5^x$ is vertically stretched by 4 and reflected across the y-axis. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = x - 2$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>17.</b> $h(x) = \ln(12x) + 1$ <b>18.</b> $f(x) = \frac{1}{2} \frac{2}{18} \frac{4}{162} \frac{5}{486}$ <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>19.</b> $f(x) = \ln(3x)$ is horizontally compressed by $\frac{1}{4}$ and vertically translated 1 unit up. <b>11.</b> $\overline{x - 2 - 1}$ 0 1 2 3	<b>The set of the set o</b>