

Additional Practice

Investigation 2

Growing, Growing, Growing

1. A bathtub is being filled at a rate of 2.5 gallons per minute. The bathtub will hold 20 gallons of water.

 - a. How long will it take to fill the bathtub?

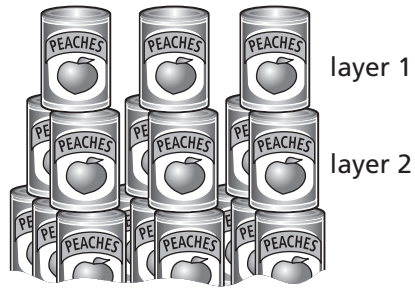
b. Is the relationship described linear, inverse, exponential, or neither? Write an equation relating the variables.
2. Suppose a single bacterium lands on one of your teeth and starts reproducing by a factor of 4 every hour.

 - a. After how many hours will there be at least 1,000,000 bacteria in the new colony?

b. Is the relationship described linear, inverse, exponential, or neither? Write an equation relating the variables.

Additional Practice *(continued)***Investigation 2****Growing, Growing, Growing**

3. Two students who work in a grocery store are making a display of canned goods. They build a tower of cans 12 layers deep. The first layer, at the top, contains three cans in a row. The second layer contains six cans, in two rows of three that support the first layer. The third layer has nine cans, in three rows of three that support the second layer.



- a. How many cans are in layer 12, the bottom layer?
- b. Is the relationship described linear, inverse, exponential, or neither? Write an equation relating the variables.
4. An experimental plant has an unusual growth pattern. On each day, the plant doubles its height of the previous day. On the first day of the experiment, the plant grows to twice, or 2 times, its original height. On the second day, the plant grows to 4 times its original height. On the third day, the plant grows to 8 times its original height.
- a. How many times its original height does the plant reach on the sixth day?
On the n th day?
- b. If the plant is 128 centimeters tall on the ninth day, how tall was it just before the experiment began?
- c. Is the relationship described linear, inverse, exponential, or neither? Write an equation relating the variables.

Additional Practice *(continued)***Investigation 2****Growing, Growing, Growing**

Study the pattern in each table. Tell whether the relationship between x and y is linear, inverse, exponential, or neither, and explain your reasoning. If the relationship is linear, inverse, or exponential, write an equation for it.

5.

x	0	1	2	3	4	5
y	2	9	16	23	30	37

6.

x	0	1	2	3	4	5
y	2	4	8	16	32	64

7.

x	0	1	2	3	4	5
y	$\frac{1}{16}$	$\frac{1}{4}$	1	4	16	64

8.

x	0	1	2	3	4	5
y	1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$

9.

x	0	1	2	3	4	5
y	1	14	116	614	2,156	10,124

Additional Practice: Digital Assessments

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10. Which of the following statements describe the graph of $y = 3 \cdot 4^x$? *Select all that apply.*

- The graph represents exponential growth.
- The y-intercept is $(0, 1)$.
- There is no x-intercept.
- The graph passes through the point $(1, 12)$.

11. Suppose an investment increases in value 2.5 times every 8 years. Complete the table using the tiles.

Time (years)	Value of Investment
Initial	\$500
8	
16	
24	

12. An empty tank that holds 18,000 gallons of water is being filled from a pipe at a rate of 30 gallons per minute. Circle the number, word, or expression that makes each statement true.

There will be $\left[\begin{array}{c} 300 \\ 600 \\ 1,800 \end{array} \right]$ gallons of water in the tank after 10 minutes.

The tank will be filled after $\left[\begin{array}{c} 30 \\ 300 \\ 600 \end{array} \right]$ minutes.

This relationship can be described as $\left[\begin{array}{c} \text{linear} \\ \text{exponential} \\ \text{inverse} \end{array} \right]$.

An equation to represent the number of gallons of water, g , in the tank after

t minutes is $g = \left[\begin{array}{c} 30t \\ 30^t \\ 30 + t \end{array} \right]$.

Skill: Exponential Functions

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Complete the table for each exercise.

1. An investment increases by 1.5 times every 5 years.

Time (years)	Value of Investment
Initial	\$800
5	\$1,200
10	\$1,800
15	\$2,700
20	
25	

Write an equation for each where $x = \#$ of years

2. The number of animals doubles every 3 months.

Time (months)	Number of Animals
Initial	18
3	36
6	72
9	
12	

3. The amount of matter doubles every 6 months.

Time (years)	Amount of Matter (grams)
Initial	10
1	40
2	160
3	
4	

Additional Practice

Investigation 3

Growing, Growing, Growing

1. Suppose you deposit \$1,000 in a savings account that earns interest of 6% per year on the current balance in the account.

a. If you leave your money in the account for 10 years, what will the value of your investment be at the end of the 10 years?

b. Write an equation relating the variables.

2. Janelle deposits \$2,000 in the bank. The bank will pay 5% interest per year, compounded annually. This means that Janelle's money will grow by 5% each year.

a. Make a table showing Janelle's balance at the end of each year for 5 years.

b. Write an equation for calculating the balance b at the end of any year t .

c. Approximately how many years will it take for the original deposit to double in value? Explain your reasoning.

d. Suppose the interest rate is 10%. Approximately how many years will it take for the original deposit to double in value? How does this interest rate compare with an interest rate of 5%?

Additional Practice *(continued)***Investigation 3****Growing, Growing, Growing**

For Exercises 3–6, tell whether the relationship between x and y is linear, inverse, exponential, or neither, and explain your answer. If the relationship is linear, inverse, or exponential, write an equation for the relationship.

3.

x	0	1	2	3	4	5
y	2	2.6	3.38	4.394	5.7122	7.42586

4.

x	0	1	2	3	4	5
y	500	550	605	665.5	732.05	805.255

5.

x	0	1	2	3	4	5
y	2.3	3.8	5.3	6.8	8.3	9.8

6.

x	1	2	3	4	5
y	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{10}$

Additional Practice *(continued)*

Investigation 3

Growing, Growing, Growing

7. Consider these three equations: $y = 5^x$, $y = 3^x$, and $y = 1 + 10^x$.
- Sketch graphs of the equations on one set of axes.
 - What points, if any, do the three graphs have in common?
 - In which graph does the y -value increase at the greatest rate as the x -value increases?
 - Use the graphs to figure out which of the equations is not an example of exponential growth. Explain how you know.
 - Use the equations to figure out which is not an example of exponential growth. Explain how you know.

Additional Practice: Digital Assessments

Investigation 3

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8. Consider the graphs of $y = 2^x$, $y = 6^x$ and $y = 0.5x + 1$.

Which of the following statements are true?
Select all that apply.

- All three graphs are examples of exponential growth.
- The three graphs intersect at $(0, 1)$.
- The graph of $y = 0.5x + 1$ does not intersect the x -axis.
- The graphs of $y = 2^x$ and $y = 6^x$ have only one point in common.

9. Suppose you deposit \$5,000 in a savings account that earns interest of 3% per year on the current balance in the account. Using the tiles, write an equation that represents the value of the account, V , after t years.

1.30	1.03	5,000
0.03	0.97	t

$V = (\quad) (\quad) (\quad)$

10. Choose whether each table might represent a relationship that is linear, exponential, inverse, or none of these by circling the appropriate word or phrase.

a.

x	0	1	2	3	4
y	4	4.08	4.1616	4.2448	4.3297

[

linear
exponential
inverse
none of these

]

b.

x	1	2	3	4	5
y	$\frac{2}{5}$	$\frac{1}{5}$	$\frac{2}{15}$	$\frac{1}{20}$	$\frac{2}{25}$

[

linear
exponential
inverse
none of these

]

c.

x	0	1	2	3	4
y	250	312.5	390.63	488.28	610.35

[

linear
exponential
inverse
none of these

]

d.

x	0	1	2	3	4
y	2.1	4.6	7.1	9.6	12.1

[

linear
exponential
inverse
none of these

]

Skill: Compound Interest

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For Exercises 1–2, complete each table. Compound the interest annually.

1. \$5,000 at 6% for 4 years.

Principal at Beginning of Year	Interest	Balance
Year 1: \$5,000		
Year 2:		
Year 3:		
Year 4:		

2. \$7,200 at 3% for 4 years

Principal at Beginning of Year	Interest	Balance
Year 1: \$7,200		
Year 2:		
Year 3:		
Year 4:		

3. Suppose one of your ancestors invested \$500 in 1800 in an account paying 4% interest compounded annually. Write an exponential function to model the situation. Find the account balance in each of the following years.

- a. 1850
- b. 1900
- c. 2000
- d. 2100