

Determine whether the equation represents a linear function. Explain.

1. $y = \sqrt{2x+3}$

2. $y = 2x^3 - 3x + 2$

3. $y = x + 1$

4. $y = x^2 - 1$

5. $y = 1 - \frac{1}{2}x$

6. $y = \frac{1}{2}x - 3$

Solve the system of linear equations.

1. $y = -x + 3$
 $-y = x + 3$

2. $2x + 2y = 5$
 $-2x - 2y = -5$

3. $3x + 4y = 0$
 $-3x - 4y = 0$


4. $6x - 2 = y$
 $6x = y$

Essential Question


What are some of the characteristics of the graph of an exponential function?

Work with a partner. Copy and complete each table for the exponential function $y = 16(2)^x$. In each table, what do you notice about the values of x ? What do you notice about the values of y ?

x	$y = 16(2)^x$
0	
1	
2	
3	
4	
5	



x	$y = 16(2)^x$
0	
2	
4	
6	
8	
10	



Work with a partner. Repeat Exploration 1 for the exponential function

$$y = 16\left(\frac{1}{2}\right)^x.$$

Do you think the statement below is true for *any* exponential function?
Justify your answer.

“As the independent variable x changes by a constant amount, the dependent variable y is multiplied by a constant factor.”

Work with a partner. Sketch the graphs of the functions given in Explorations 1 and 2. How are the graphs similar? How are they different?

Does each table represent a *linear* or an *exponential* function? Explain.

a.

x	0	1	2	3
y	2	4	6	8

b.

x	0	1	2	3
y	4	8	16	32

Evaluate each function for the given value of x .

a. $y = -2(5)^x; x = 3$

b. $y = 3(0.5)^x; x = -2$

Does the table represent a *linear* or an *exponential* function?
Explain.

1.

x	0	1	2	3
y	8	4	2	1

2.

x	-4	0	4	8
y	1	0	-1	-2

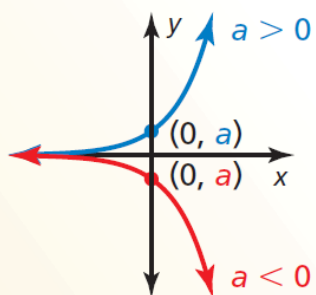
Evaluate the function when $x = -2$, 0 , and $\frac{1}{2}$.

3. $y = 2(9)^x$

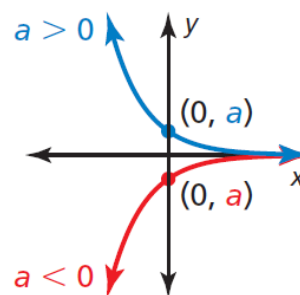
4. $y = 1.5(2)^x$

Core Concept

Graphing $y = ab^x$ When $b > 1$



Graphing $y = ab^x$ When $0 < b < 1$



Graph $f(x) = 4(2)^x$. Compare the graph to the graph of the parent function. Describe the domain and range of f .

Graph $f(x) = -\left(\frac{1}{2}\right)^x$. Compare the graph to the graph of the parent function. Describe the domain and range of f .

Graph the function. Compare the graph to the graph of the parent function. Describe the domain and range of f .

5. $f(x) = -2(4)^x$

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

Graph $y = 4(2)^{x-3} + 2$. Describe the domain and range.

An exponential function g models a relationship in which the dependent variable is multiplied by 1.5 for every 1 unit the independent variable x increases. Graph g when $g(0) = 4$. Compare g and the function f from Example 3 over the interval $x = 0$ to $x = 2$.

Graph the function. Describe the domain and range.

7. $y = -2(3)^{x+2} - 1$

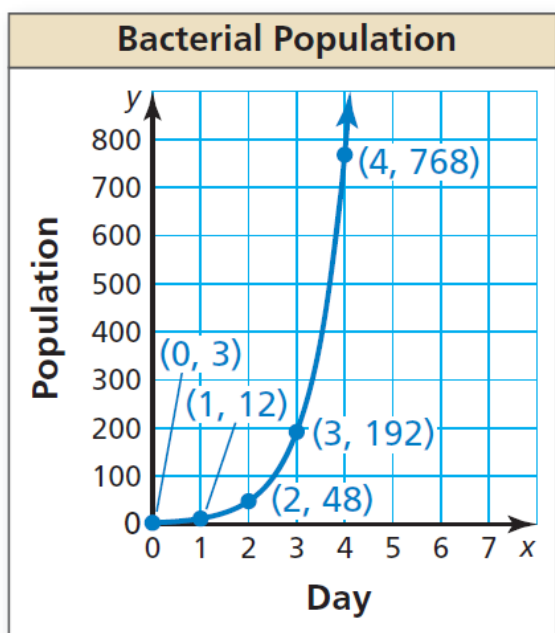
8. $f(x) = (0.25)^x + 3$

9. **WHAT IF?** In Example 6, the dependent variable of g is multiplied by 3 for every 1 unit the independent variable x increases. Graph g when $g(0) = 4$. Compare g and the function f from Example 3 over the interval $x = 0$ to $x = 2$.

The graph represents a bacterial population y after x days.

a. Write an exponential function that represents the population.

b. Find the population after 12 hours and after 5 days.



10. A bacterial population y after x days can be represented by an exponential function whose graph passes through $(0, 100)$ and $(1, 200)$. (a) Write a function that represents the population. (b) Find the population after 6 days. (c) Does this bacterial population grow faster than the bacterial population in Example 7? Explain.

- **Response Logs:** Select from “I made progress with ...” or “Tomorrow I need to find out ...” or “Right now I know”