

Unit 4: Modeling and Analyzing Exponential Functions

4.1 Create Equations that Describe Numbers or Relationships

1. A certain population of bacteria has an average growth rate of 2%. The formula for the growth of the bacteria's population is $A = P_0 \cdot 1.02^t$, where P_0 is the original population and t is the time in hours.

If you begin with 200 bacteria, about how many bacteria will there be after 100 hours?

- A. 7
- B. 272
- C. 1,449
- D. 20,000

Answer to Unit 4.1 Sample Item

1. C

4.2 Build a Function that Models a Relationship between Two Quantities

1. Which function represents this sequence?

n	1	2	3	4	5	...
a_n	6	18	54	162	486	...

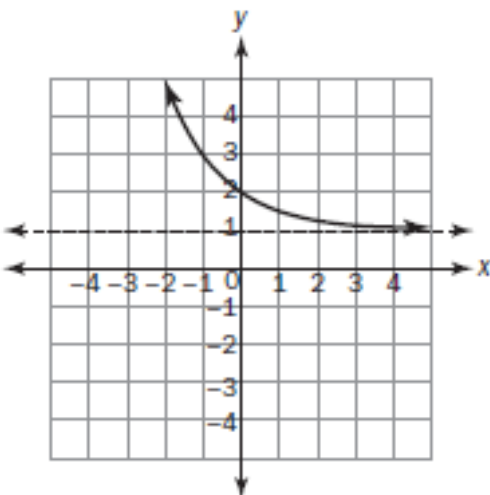
- A. $f(n) = 3^{n-1}$
 - B. $f(n) = 6^{n-1}$
 - C. $f(n) = 3(6^{n-1})$
 - D. $f(n) = 6(3^{n-1})$
2. The points (0, 1), (1, 5), (2, 25), and (3, 125) are on the graph of a function. Which equation represents that function?
- A. $f(x) = 2^x$
 - B. $f(x) = 3^x$
 - C. $f(x) = 4^x$
 - D. $f(x) = 5^x$

Answers to Unit 4.2 Sample Items

1. D 2. D

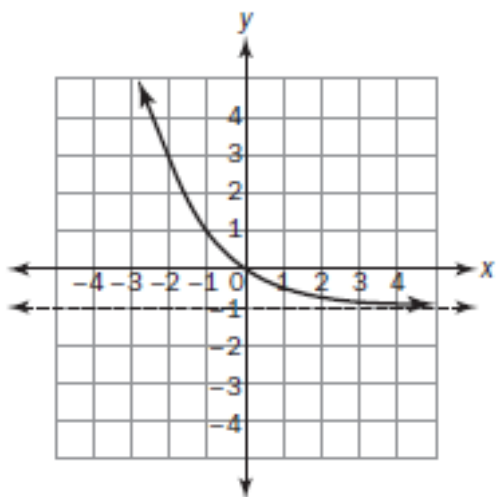
4.3 Build New Functions from Existing Functions

1. The function $f(x)$ is graphed below.

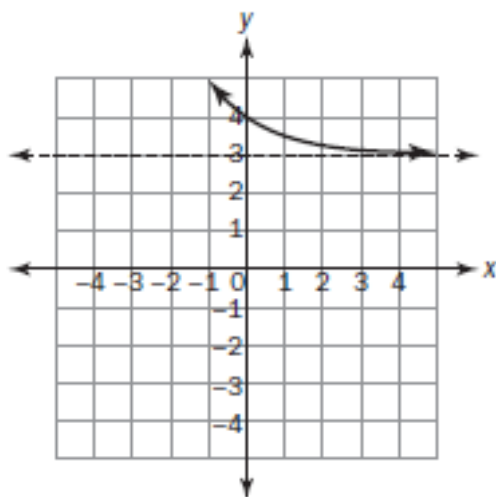


Which graph shows $f(x) + 2$?

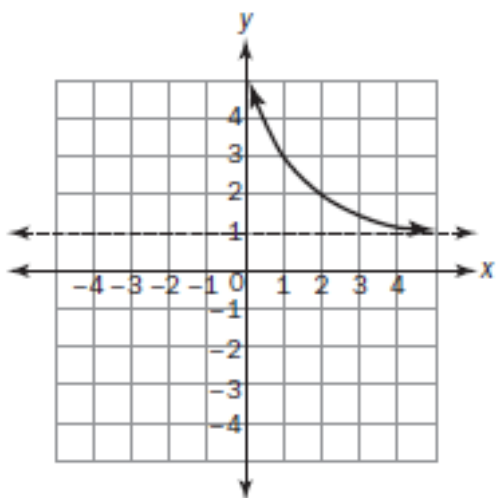
A.



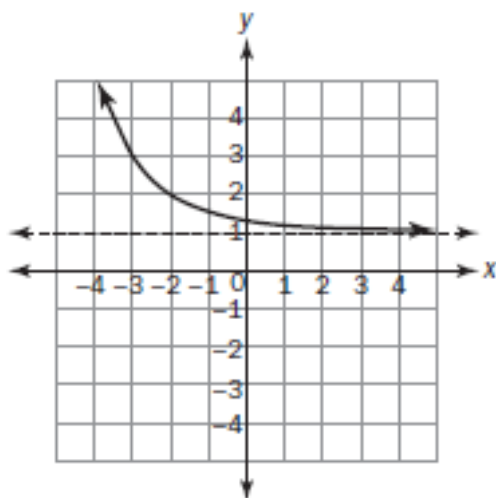
B.



C.



D.



2. Which function shows the function $f(x) = 3^x$ being translated 5 units down?

A. $f(x) = 3^x - 5$

B. $f(x) = 3^{(x+5)}$

C. $f(x) = 3^{(x-5)}$

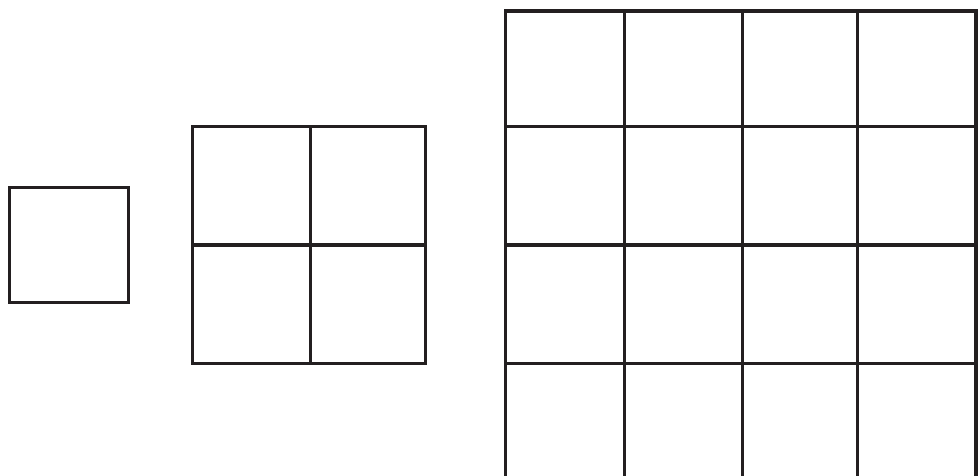
D. $f(x) = 3^x + 5$

Answers to Unit 4.3 Sample Items

1. B 2. A

4.4 Understand the Concept of a Function and Use Function Notation

1. Consider this pattern.



Which recursive formula represents the sequence that represents the pattern?

A. $a_n = (4)^{(n-1)}$

B. $a_n = (4)^{(a_n-1)}$

C. $a_n = (a_n)(4)^{(n-1)}$

D. $a_n = (a_n)^4$

2. Which function is modeled in this table?

x	$f(x)$
1	1,000
2	800
3	640
4	512

- A. $f(x) = 1,000(0.80)^x$
- B. $f(x) = 1,000(0.20)^x$
- C. $f(x) = 1,000(0.80)^{x-1}$
- D. $f(x) = 1,000(0.20)^{x-1}$

3. Which explicit formula describes the pattern in this table?

d	C
0	1
1	6
2	36
3	216

- A. $C = 6d$
- B. $C = d + 6$
- C. $C = 6^d$
- D. $C = d^6$

4. If $f(12) = 100(0.50)^{12}$, which expression gives $f(x)$?

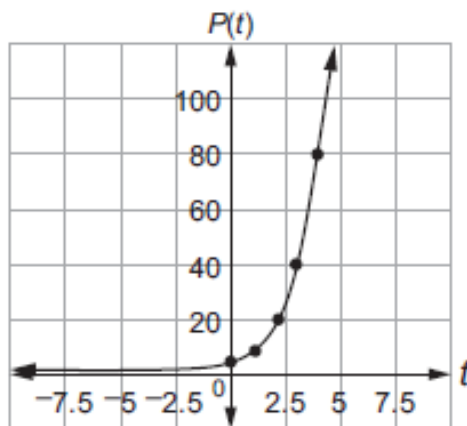
- A. $f(x) = 0.50^x$
- B. $f(x) = 100^x$
- C. $f(x) = 100(x)^{12}$
- D. $f(x) = 100(0.50)^x$

Answers to Unit 4.4 Sample Items

1. A 2. C 3. C 4. D

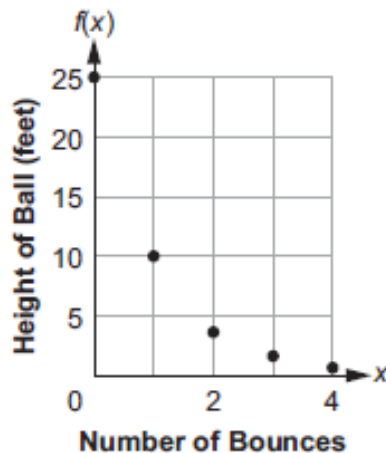
4.5 Interpret Functions that Arise in Applications in Terms of Context

1. A population of squirrels doubles every year. Initially, there were 5 squirrels. A biologist studying the squirrels created a function to model their population growth: $P(t) = 5(2^t)$, where t is the time in years. The graph of the function is shown.



Which values best describe the range of the population?

- A. any real number
 - B. any whole number greater than 0
 - C. any whole number greater than 5
 - D. any whole number greater than or equal to 5
2. The function graphed on this coordinate grid shows $f(x)$, the height of a dropped ball, in feet, after its x th bounce.

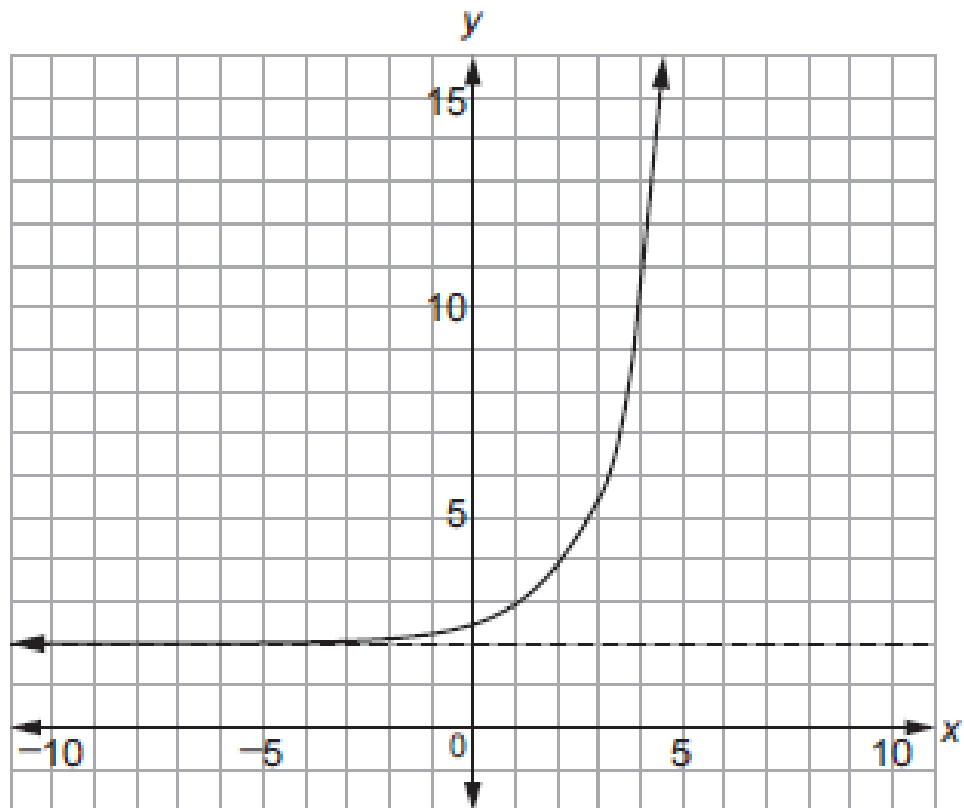


On which bounce was the height of the ball 10 feet?

- A. bounce 1
- B. bounce 2
- C. bounce 3
- D. bounce 4

4.6 Analyze Functions Using Different Representations

1. Look at the graph.



Which equation represents this graph?

- A. $y = 2^{(x+1)} - 2$
- B. $y = 2^{(x-1)} + 2$
- C. $y = 2^{(x+2)} - 1$
- D. $y = 2^{(x-2)} + 1$

Answer to Unit 4.6 Sample Item

1. B