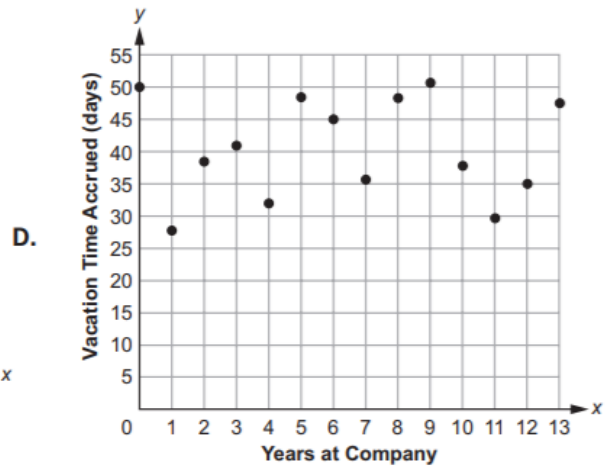
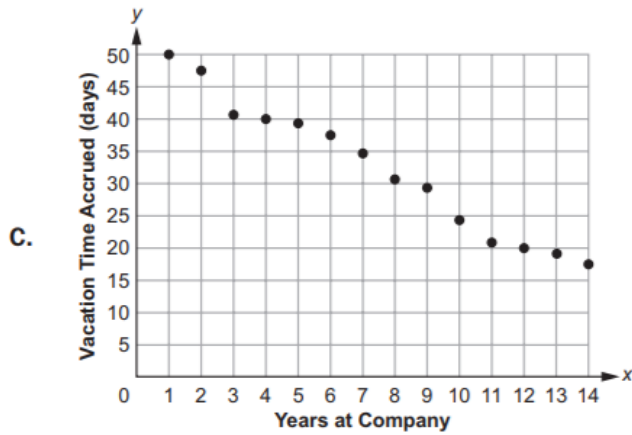
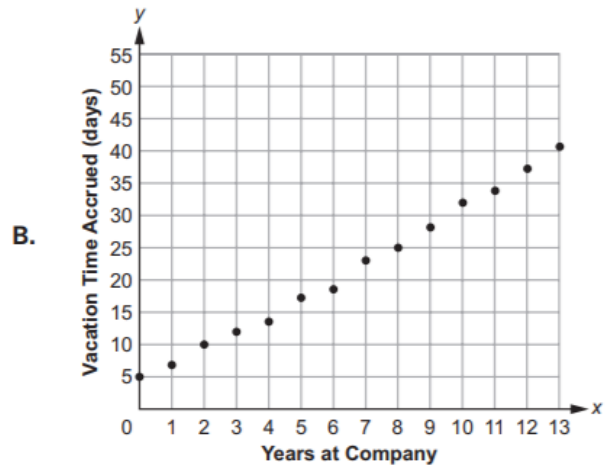
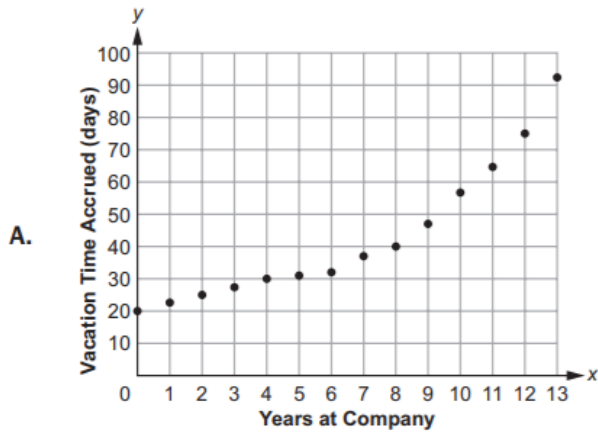


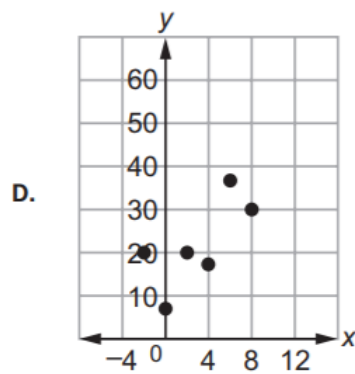
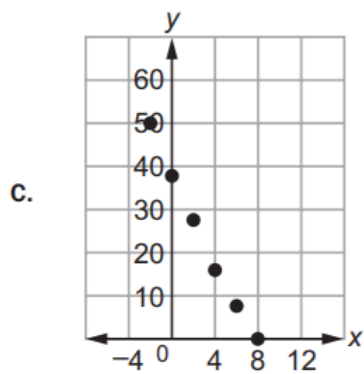
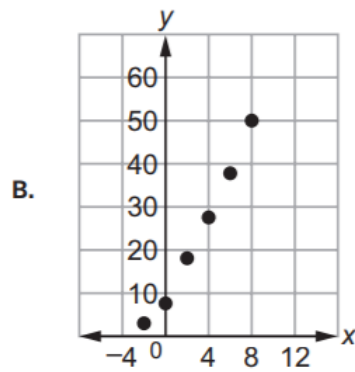
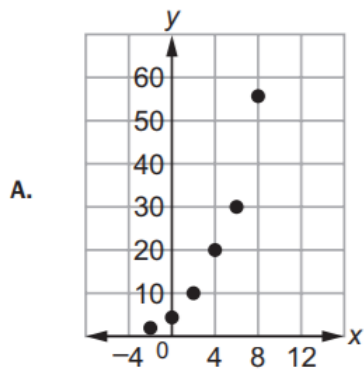
Unit 5: Comparing and Contrasting Functions

5.1 Construct and Compare Linear, Quadratic, and Exponential Models and Solve Problems

1. Which scatter plot BEST represents a model of linear growth?



2. Which scatter plot BEST represents a model of exponential growth?



3. Which table represents an exponential function?

A.

x	0	1	2	3	4
y	5	6	7	8	9

B.

x	0	1	2	3	4
y	22	44	66	88	110

C.

x	0	1	2	3	4
y	5	13	21	29	37

D.

x	0	1	2	3	4
y	3	9	27	81	243

4. A table of values is shown for $f(x)$ and $g(x)$.

x	$f(x)$
0	0
1	1
2	4
3	9
4	16
5	25

x	$g(x)$
0	-2
1	-1
2	1
3	5
4	13
5	29

Which statement compares the graphs of $f(x)$ and $g(x)$ over the interval $[0, 5]$?

- A. The graph of $f(x)$ always exceeds the graph of $g(x)$ over the interval $[0, 5]$.
- B. The graph of $g(x)$ always exceeds the graph of $f(x)$ over the interval $[0, 5]$.
- C. The graph of $g(x)$ exceeds the graph of $f(x)$ over the interval $[0, 4]$, the graphs intersect at a point between 4 and 5, and then the graph of $f(x)$ exceeds the graph of $g(x)$.
- D. The graph of $f(x)$ exceeds the graph of $g(x)$ over the interval $[0, 4]$, the graphs intersect at a point between 4 and 5, and then the graph of $g(x)$ exceeds the graph of $f(x)$.

5. Which statement is true about the graphs of exponential functions?

- A. The graphs of exponential functions never exceed the graphs of linear and quadratic functions.
- B. The graphs of exponential functions always exceed the graphs of linear and quadratic functions.
- C. The graphs of exponential functions eventually exceed the graphs of linear and quadratic functions.
- D. The graphs of exponential functions eventually exceed the graphs of linear functions but not quadratic functions.

6. Which statement BEST describes the comparison of the function values for $f(x)$ and $g(x)$?

x	$f(x)$	$g(x)$
0	0	-10
1	2	-9
2	4	-6
3	6	-1
4	8	6

- A. The values of $f(x)$ will always exceed the values of $g(x)$.
- B. The values of $g(x)$ will always exceed the values of $f(x)$.
- C. The values of $f(x)$ exceed the values of $g(x)$ over the interval $[0, 5]$.
- D. The values of $g(x)$ begin to exceed the values of $f(x)$ within the interval $[4, 5]$.

Answers to Unit 5.1 Sample Items

1. B 2. A 3. D 4. D 5. C 6. D

5.2 Interpret Expressions for Functions in Terms of the Situation They Model

1. If the parent function is $f(x) = mx + b$, what is the value of the parameter m for the line passing through the points $(-2, 7)$ and $(4, 3)$?

- A. -9
- B. $-\frac{3}{2}$
- C. -2
- D. $-\frac{2}{3}$

2. Consider this function for cell duplication. The cells duplicate every minute.

$$f(x) = 75(2)^x$$

- A. The 75 is the initial number of cells, and the 2 indicates that the number of cells doubles every minute.
- B. The 75 is the initial number of cells, and the 2 indicates that the number of cells increases by 2 every minute.
- C. The 75 is the number of cells at 1 minute, and the 2 indicates that the number of cells doubles every minute.
- D. The 75 is the number of cells at 1 minute, and the 2 indicates that the number of cells increases by 2 every minute.

Answers to Unit 5.2 Sample Items

1. D 2. A

5.3 Build New Functions from Existing Functions

1. What is the y -intercept of the graph of $h(x) = 2^x - 4$?

- A. $(0, -4)$
- B. $(0, -3)$
- C. $(0, 1)$
- D. $(0, 2)$

2. What is the range of the graph of $f(x) = -3(x - 4)$?

- A. $(-3, 4)$
- B. $(-3, \infty)$
- C. $(-\infty, 4)$
- D. $(-\infty, \infty)$

Answers to Unit 5.3 Sample Items

1. B 2. D

5.4 Understand the Concept of a Function and Use Function Notation

1. Which function is modeled in this table?

x	$f(x)$
1	8
2	40
3	200
4	1,000

A. $f(x) = x + 7$

B. $f(x) = 5x + 8$

C. $f(x) = (8)^x$

D. $f(x) = \frac{8}{5}(5)^x$

2. If $f(12) = 4(12) - 20$, which function gives $f(x)$?

A. $f(x) = 4x^2 - 20$

B. $f(x) = 4^x - 20$

C. $f(x) = 4x - 20$

D. $f(x) = 4x^2 + 12x - 20$

3. Which function has a range of $f(x) \leq \frac{3}{4}$?

A. $f(x) = \frac{3}{4}x + 5$

B. $f(x) = -x^2 + \frac{3}{4}$

C. $f(x) = x^2 - \frac{3}{4}$

D. $f(x) = \frac{3}{4} - 5x$

Answers to Unit 5.4 Sample Items

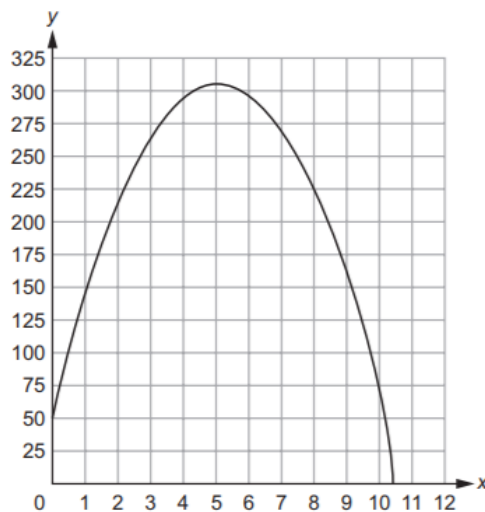
1. D 2. C 3. B

5.5 Interpret Functions That Arise in Applications in Terms of the Context

1. A sample of 1,000 bacteria becomes infected with a virus. Each day, one-fourth of the bacteria sample dies due to the virus. A biologist studying the bacteria models the population of the bacteria with the function $P(t) = 1,000(0.75)^t$, where t is the time, in days.

What is the range of this function in this context?

- A. any real number such that $t \geq 0$
 - B. any whole number such that $t \geq 0$
 - C. any real number such that $0 \leq P(t) \leq 1,000$
 - D. any whole number such that $0 < P(t) \leq 1,000$
2. The graph shows the height, y , in meters, of a rocket above sea level in terms of the time, t , in seconds, since it was launched. The rocket landed at sea level.



What does the x -intercept represent in this situation?

- A. the height from which the rocket was launched
- B. the time it took the rocket to return to sea level
- C. the total distance the rocket flew while it was in flight
- D. the time it took the rocket to reach the highest point in its flight

Answers to Unit 5.5 Sample Items

1. D 2. B