Linear and Exponential Relationships

Unit Assessment

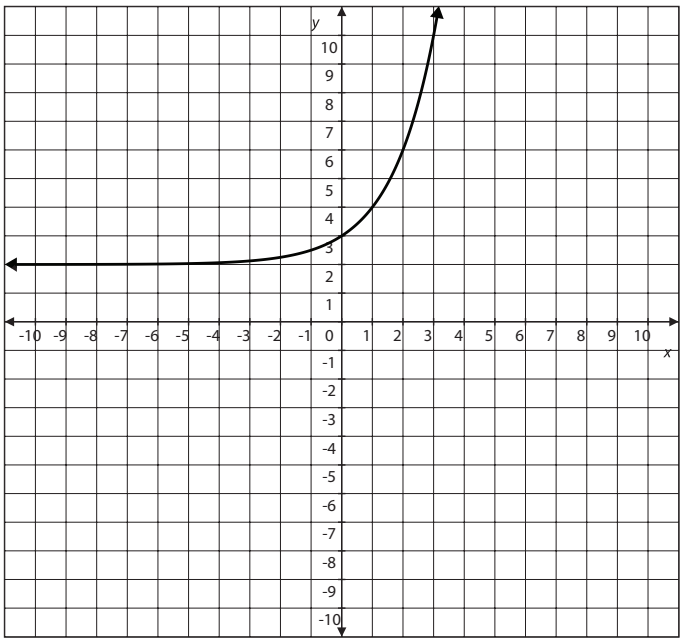
Technology Enhanced

Circle the letter of the best answer.

1. If $f(x) = 3x - 5$ and the domain of f is {2, 4, 6}, what is the range of $f(x)$?

   a. {11, 17, 20}
   c. {2, 4, 6}
   b. {–6, –4, –2}
   d. {1, 7, 13}

2. Given the graph of $f(x)$, what is $f(2)$?



   a. 2
   c. 6
   b. 0
   d. 10

3. If $a_n = a_{n-1} + 4$ and $a_5 = 12$, what is a_7?

   a. 11
   c. 20
   b. 10
   d. 19

4. What is the rate of change for the function $f(x) = 5(2)^{\frac{x}{4}}$ over the interval [8, 12]?

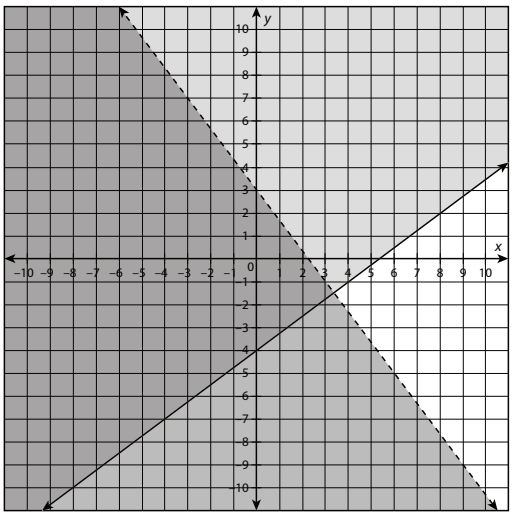
   a. 320
   c. 5
   b. 10
   d. The rate of change cannot be determined.

continued

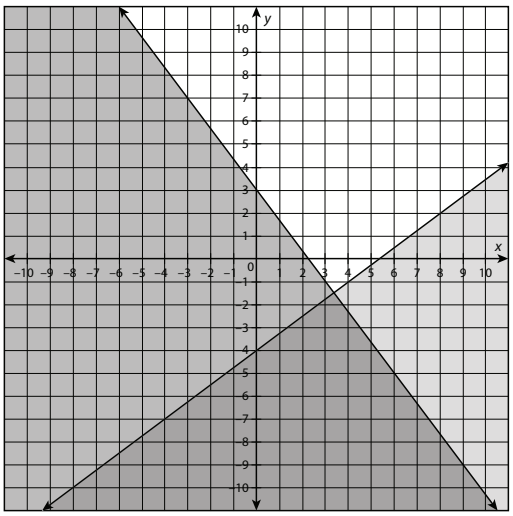
5. Which graph represents the solution to the following system of linear inequalities?

$$\begin{cases} 3x - 4y \leq 16 \\ 4x + 3y < 9 \end{cases}$$

a.



c.



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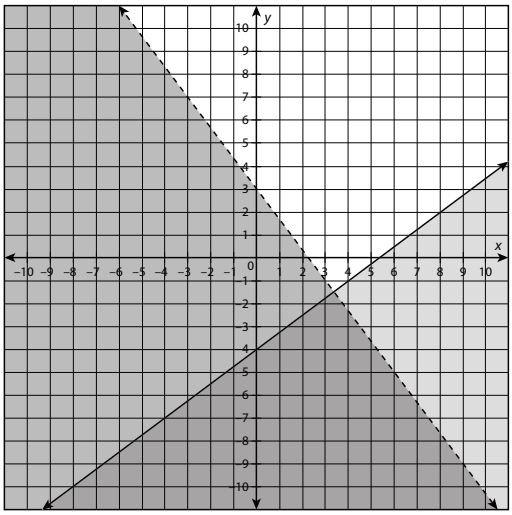
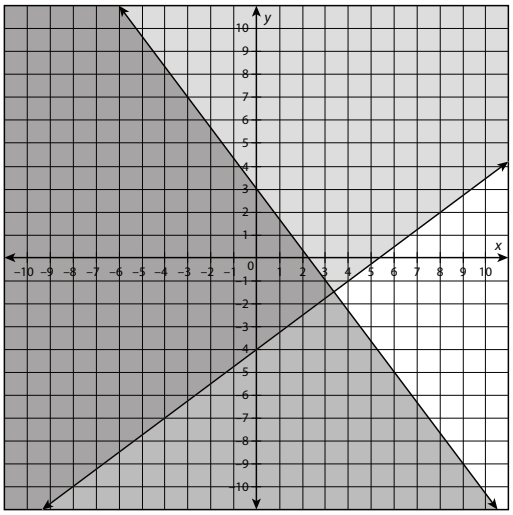


d.



continued

6. Given the equation for $f(x)$ and the table that represents $g(x)$, which of the following statements is true about the functions $f(x)$ and $g(x)$?

$f(x)=\frac{2}{5}x-3$

x	$g(x)$
–4	–29
–2	–17
2	7
4	19

a. The y-intercept of the function $f(x)$ is less than the y-intercept of the function $g(x)$.

b. The y-intercept of the function $f(x)$ is greater than the y-intercept of the function $g(x)$.

c. The y-intercept of the function $f(x)$ is equal to the y-intercept of the function $g(x)$.

d. The y-intercepts cannot be determined.

7. Which explicit function represents the pattern in the table?

x	$f(x)$
1	–5
2	–35
3	–245
4	–1715

a. $f(x)=(-5)^{x-1}$

b. $f(x)=-7\bullet(5)^{x-1}$

c. $f(x)=(5)\bullet(-7)^{x-1}$

d. $f(x)=(-5)\bullet 7^{x-1}$

8. If $f(x)=5^x$ and $g(x) = 6$, what is $(f \bullet g)(x)$?

a. $(f \bullet g)(x) = 6\left(5^x\right)$

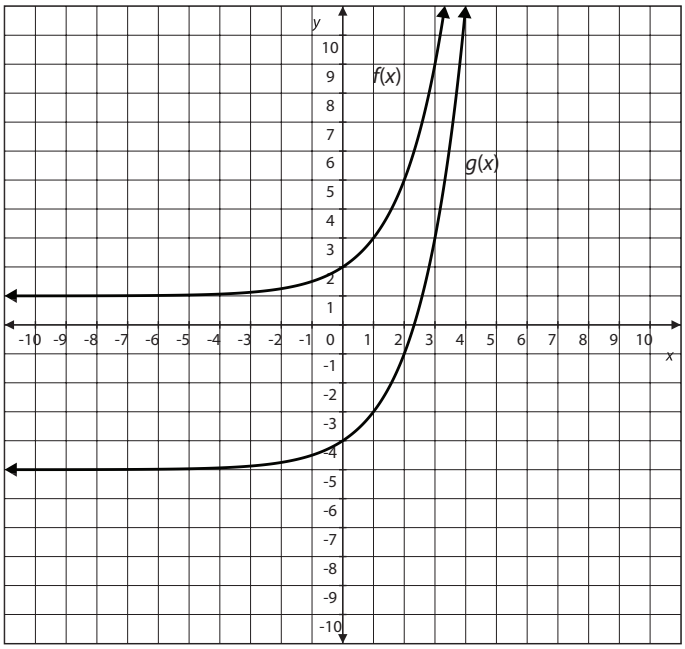
b. $(f \bullet g)(x) = 6^x$

c. $(f \bullet g)(x) = 30^x$

d. $(f \bullet g)(x) = 6+5^x$

continued

9. Given the graph of $f(x)$ and $g(x)$, which is the function rule for $g(x)$ in terms of $f(x)$?



a. $g(x) = f(x) + 6$

b. $g(x) = f(x) - 4$

c. $g(x) = f(x) - 6$

d. $g(x) = f(x) + 4$

10. The recursive formula for an arithmetic sequence is given as $a_n = a_{n-1} + 9$, with $a_1 = 3$. What is the seventh term of the sequence?

a. 13

b. 21

c. 48

d. 57

11. The explicit formula for a geometric sequence is $a_n = 3(-2)^{n-1}$. What is the fifth term of the sequence?

a. –96

b. 48

c. 192

d. –48

continued

12. Leroy makes $9 per hour cleaning cars. His boss offers to pay him an additional $45 a week for cleaning the garage after work. What are the parameters in this scenario?

    a. 0 and 45
    b. 1 and 54
    c. 9 and 45
    d. x and $f(x)$

For problems 13 and 14, read each scenario. Then write a function and graph it to solve the problem.

13. The starting balance of Adam's savings account is $575. Each month, Adam deposits $60.

    a. Write a function to model this scenario.

    b. Create a graph to show how much money Adam has in his savings account each month for the first year.

    c. Identify the key features of the function. Determine the x- and y-intercepts, the maximum, the minimum, whether the function is increasing or decreasing, and the rate of change of the function.

14. A population of bees is decreasing. The population in a particular region this year is 1,250. After 1 year, it is estimated that the population will be 1,000. After 3 years, it is estimated that the population will be 640.

    a. Write a function to model this scenario.

    b. Create a graph to show the bee population over the next 10 years.

    c. Identify the key features of the function. Identify the x- and y-intercepts. Determine the maximum, the minimum, whether the function is increasing or decreasing, the rate of change of the function over the interval [0, 10], and any asymptotes.

continued

Use what you know about linear and exponential functions to solve the problem.

15. You are looking to invest \$1,500. One savings option follows the function $f(x) = 52.5x + 1500$, where x is the time in years and $f(x)$ is the amount of money in savings after x years. The second option is represented by the function $g(x)=1500\left(1+\frac{0.025}{4}\right)^{4x}$, where x is the time in years and $g(x)$ is the amount of money after x years.

    a. Which increases faster, $f(x)$ or $g(x)$? Use a graph to explain your answer.

    b. What are the coordinates of the point where $f(x) = g(x)$?

    c. If you were looking to withdraw the money at age 55 and you invest your money at the age of 50, would you choose differently than if you were looking to invest your money at the age of 20? Explain your reasoning.