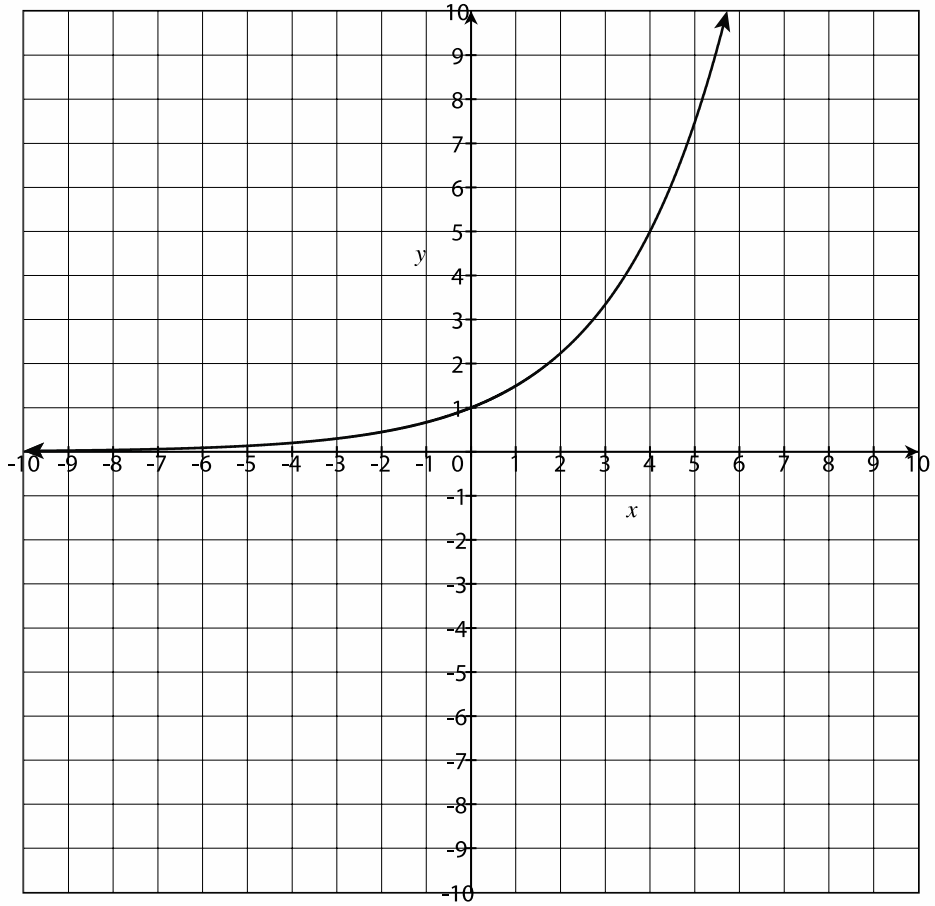
Unit 4 Exponential Functions Test

What is the apparent range of the function graphed below?



a. all real numbers

b. $x < 6$

c. $f(x) > 0$

d. infinity

DeAndre modeled the growth of his ant population using the function $a(x) = 2(4)^{\frac{x}{3}}$, where x is in days. He started with 2 ants, and the population quadruples every 3 days. He evaluated the function at $f(12)$ and calculated $f(12) = 512$. What does his calculation say about the ant population?

a. After 4 days, DeAndre will have 512 ants.

b. After 12 days, DeAndre will have 512 ants.

c. After 512 days, DeAndre will have 12 ants.

d. After 512 days, DeAndre will have about 171 ants.

Use the table below to determine the rate of change for the interval [10, 15].

Weeks (x)	Amount owed in dollars ($f(x)$)
0	1500
5	1350
10	1200
15	1050
20	900

a. \$150 per week
b. \$10 per week
c. \$30 per week
d. \$15 per week

What is the rate of change for the function $f(x)=10(2)^{\frac{x}{2}}$ over the interval [4, 8]?

a. 15
b. 30
c. 4
d. The rate of change cannot be determined.

What is the y-intercept of the graph of $f(x)=\frac{1}{4}(4)^x+2$?

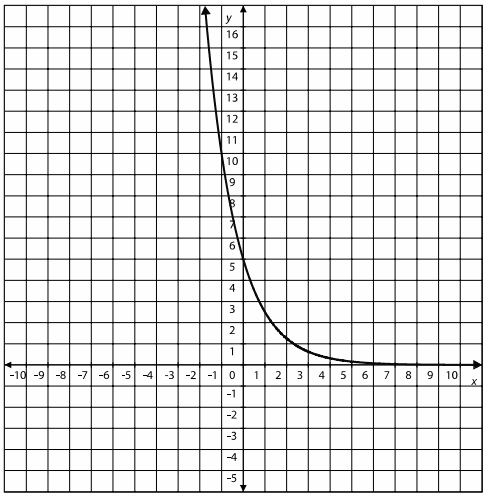
a. (2, 0)
b. (2.25, 0)
c. (0, 2)
d. (0, 2.25)

Which explicit equation represents the pattern in the table below?

x	y
1	–10
2	–90
3	–810
4	–7290

a. $f(x)=(-10)^{x-1}$
b. $f(x)=(-10)\bullet 9^{x-1}$
c. $f(x)=10\bullet(-9)^{x-1}$
d. $f(x)=-9\bullet(-10)^{x-1}$

What is the best description of the end behavior of the graph below?



a. growth, with a horizontal asymptote of $y = 1$

b. decay, with a horizontal asymptote of $y = 0$

c. growth, with a horizontal asymptote of $y = 0$

d. decay, with a horizontal asymptote of $y = 1$

Jonathan is putting on a play. He sells tickets for $10 each. Which equation describes the total money he earns for any number of tickets sold?

a. $f(x)=10^x$

b. $f(x) = 10x$

c. $f(x) = 10 + x$

d. $f(x) = -10x$

Which equation represents the relationship between x and y shown in the table below?

x	y
0	3
1	42
2	588
3	8232

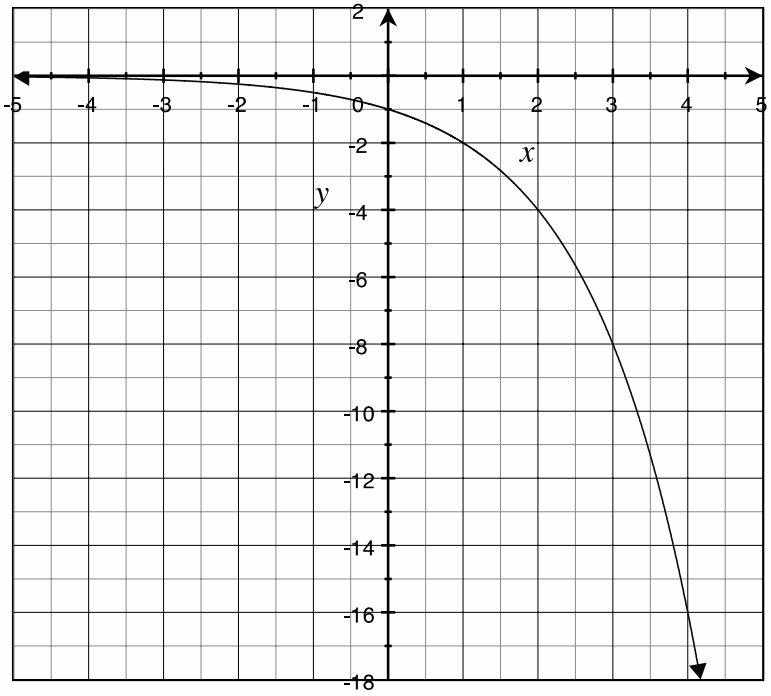
a. $f(x)=14^x$

b. $f(x)=3^x$

c. $f(x)=14\bullet 3^x$

d. $f(x)=3\bullet 14^x$

Which equation represents the relationship between x and y shown in the graph below?



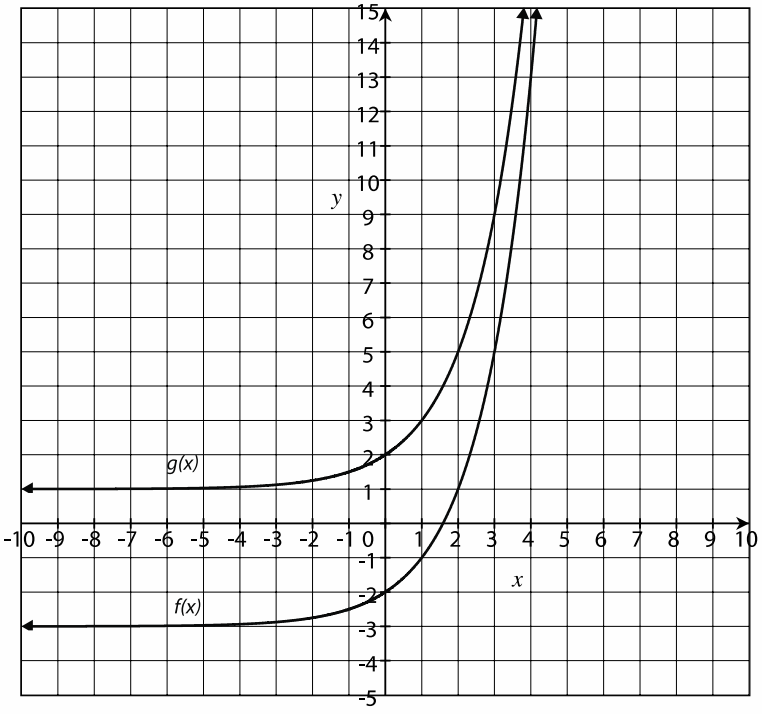
a. $f(x)=-2x-1$

b. $f(x)=2^x$

c. $f(x)=(-2)^x$

d. $f(x)=(-1)\bullet 2^x$

Given the graphs of $f(x)$ and $g(x)$ below, which is the function rule for $g(x)$ in terms of $f(x)$?



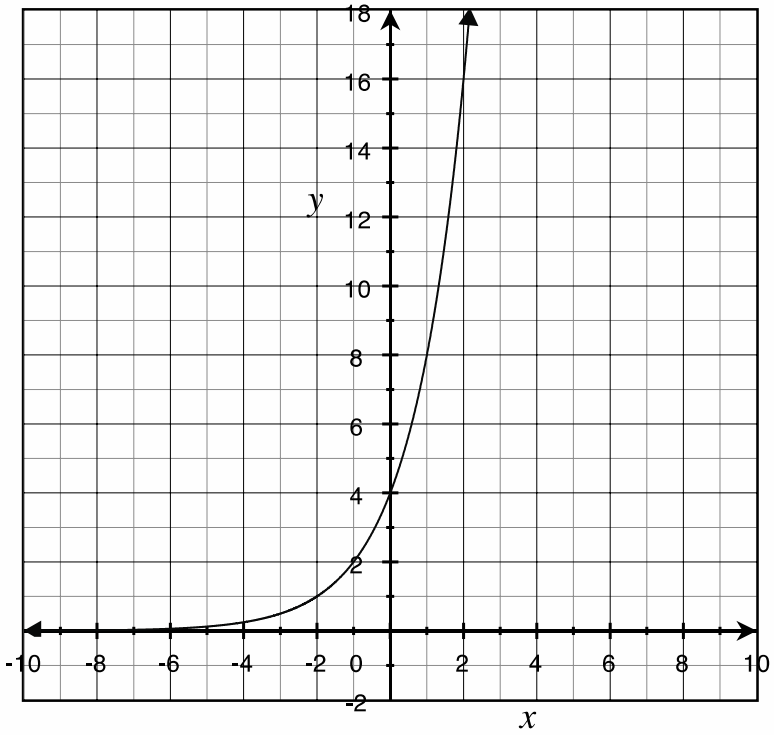
a. $g(x)=f(x)-3$

b. $g(x)=f(x)+3$

c. $g(x)=f(x)+1$

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

Which explicit equation represents the relationship between x and y in the graph below?



a. $f(x)=-4\bullet 2^x$

b. $f(x)=-2\bullet 4^x$

c. $f(x)=4\bullet 2^x$

d. $f(x)=4\bullet 4^x$

Identify the parameters in the function $f(x)=2^x+3$.

a. The growth factor is 2 and the vertical shift is 3.

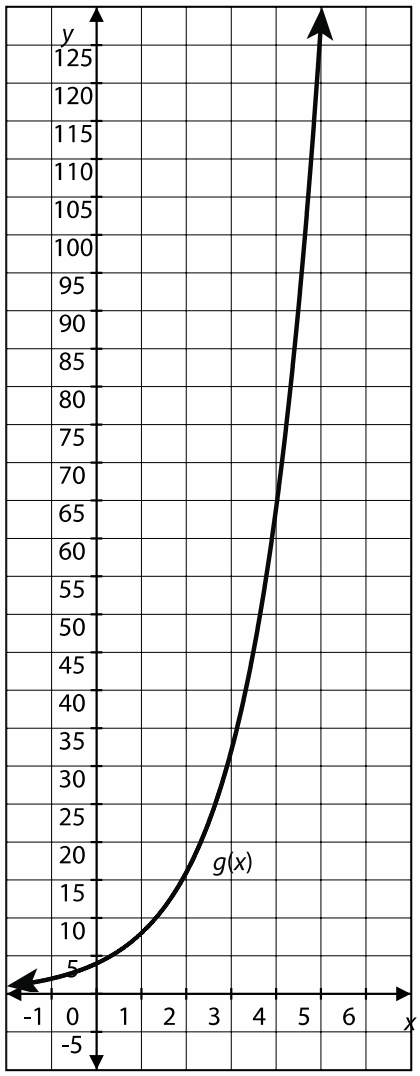
b. x and $f(x)$

c. The growth factor is 3 and the vertical shift is 2.

d. 0 and 4

Which of the following statements is true about the functions $f(x)$ and $g(x)$?

x	$f(x)$
–1	1.5
0	3
1	6
2	12



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.

Constructed Response - Choose ONE of the following questions.

Show ALL work on this sheet.

. 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.

You are looking to invest $1,500. One savings option follows the function $f(x) = 52.5x + 1500$, where $f(x)$ 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 $g(x)$ 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. At what point does the value of $f(x)$ equal the value of $g(x)$?

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.
