

Chapter 7 Test

Multiple Choice

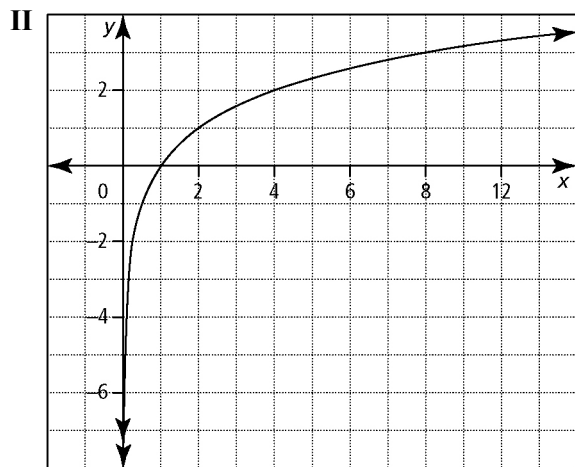
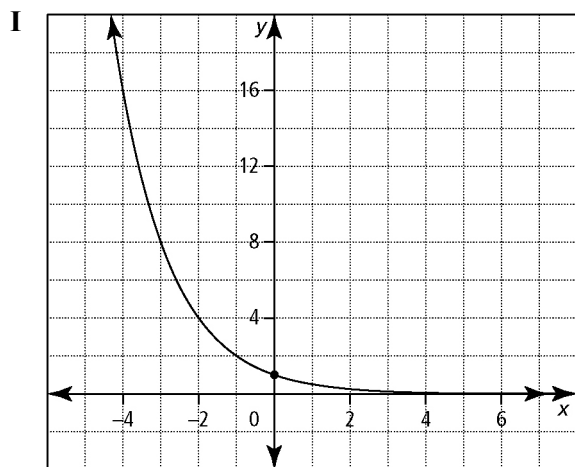
For #1 to #6, choose the best answer.

- What is the y-intercept for the graph of $y = b^{x-2}$, $b > 1$?
 A $\frac{-1}{b^2}$ B $-b^2$
 C $\frac{1}{b^2}$ D 2
- In the equation $y = b^x$, $b > 1$, x is replaced by $x - 3$ and y is replaced by $y - 4$. Which of the following statements describes the transformation?
 A The point (x, y) on the graph of $y = b^x$ has been transformed to the point $(x + 3, y + 4)$.
 B The point (x, y) on the graph of $y = b^x$ has been transformed to the point $(x - 3, y - 4)$.
 C The graph of $y = b^x$ has been translated 4 units to the right and 3 units up.
 D The graph of $y = b^x$ has been translated 3 units to the left and 4 units down.
- The graph of $f(x) = a^x$, $a > 1$, is transformed into $g(x) = 4a^{x+3} - 2$. Which characteristic remains the same?
 A domain
 B range
 C x-intercept
 D y-intercept
- The graph of the function $f(x) = 3a^x + 2$, $a > 0$, has the same horizontal asymptote as which of the following?
 A $y = -f(x) - 4$
 B $y = -f(x) - 2$
 C $y = -f(x) + 2$
 D $y = -f(x) + 4$
- Mary was asked to solve for x and y in the exponential equations $5^{x+3y} = 1$ and $25^{x+y} = \frac{1}{5}$. Which of the following linear equations would lead to a correct solution?
 A $x + 3y = 1$, $x + y = -1$
 B $x + 3y = 0$, $2(x + y) = -1$
 C $x + 3y = 1$, $2x + y = -1$
 D $x + 3y = 0$, $x + y = -2$
- Which function(s) would you graph to solve the equation $16^{-\frac{1}{2}x} = \left(\frac{1}{2}\right)^{4x+3}$ graphically.
 A $y_1 = 16^{-0.5x}$, $y_2 = 0.5^{4x+3}$
 B $y_1 = 16^{-\frac{1}{2x}} - \left(\frac{1}{2}\right)^{4x+3}$
 C $y_1 = \left(\frac{1}{2}\right)^{4x+3} + 16^{\frac{1}{2}x}$
 D $y_1 = 4x$, $y_2 = \left(\frac{1}{2}\right)^{4x+3}$

Short Answer

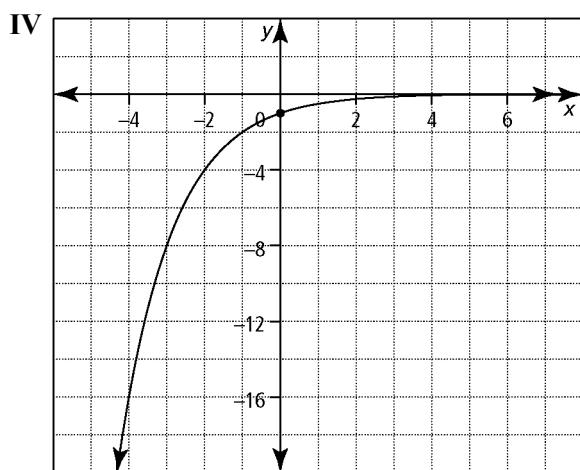
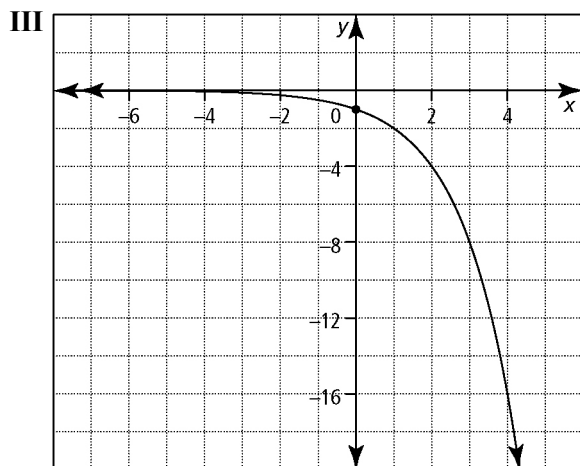
- Given the function $f(x) = 2^x$, match the graph with the correction equation.

- | | |
|--------------------|-----------------|
| a) $y = -f(x)$ | b) $y = f(-x)$ |
| c) $y = f^{-1}(x)$ | d) $y = -f(-x)$ |



BLM 7-6

(continued)



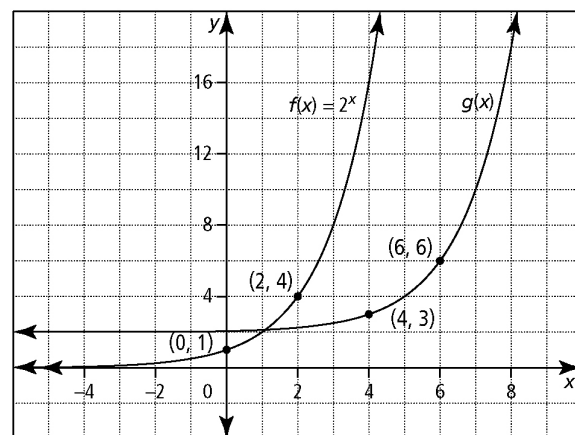
8. The function $f(x) = -5(2^x)$ is transformed by a translation 2 units right and 5 units down. The transformed function passes through the point $(x, -10)$. Determine the value of x .
9. What vertical translation would be applied to $y = 4(3^x)$ so that the translation image passes through $(2, 37)$?
10. Solve for x .
- a) $3^{\frac{x}{2}} = 81\sqrt{3}$ b) $\left(\frac{9}{16}\right)^{-x+2} = \left(\frac{64}{27}\right)^x$

Extended Response

11. You are given the functions $y = 2^{-x}$ and $y = 2(2^{-x}) - 3$.
- a) Sketch the graphs of the functions on the same grid.

- b) Describe the transformation from $y = 2^{-x}$ to $y = 2(2^{-x}) - 3$.
- c) State the range and the equation of the horizontal asymptote for each function.
- d) Determine the value of y when $x = 400$ for each function. Explain how these results relate to your answers to part c).

12. Consider the graph of the functions f and g .



- a) Determine the equation of the transformed function $g(x)$.
- b) Describe the transformation of $f(x)$ to $g(x)$.
- c) Use the graphs to solve the equation $f(x) = g(x)$, to the nearest hundredth.
13. A single cell of the bacterium *E. coli* would, under ideal circumstances, divide every 20 minutes.
- a) If a culture begins with 1 bacterium, write the equation for the number of bacteria after n minutes.
- b) Determine, to the nearest minute, the time it takes for the culture to grow to 1024 bacteria.
- c) If each bacterium has a mass of roughly 10^{-12} g, what is the mass of the bacteria after 1 day, to the nearest kg?
14. A town had a population of 2200 people in 1990. Each year the population has decreased by 10%.
- a) Write an equation to represent the population of the town.
- b) What will the population be in the year 2020?
- c) When will the population be less than 50 people?

