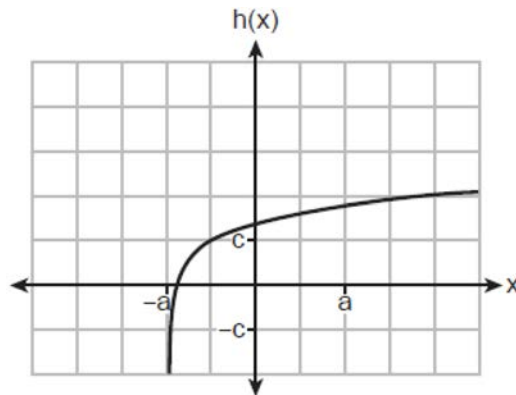


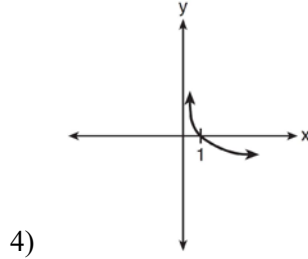
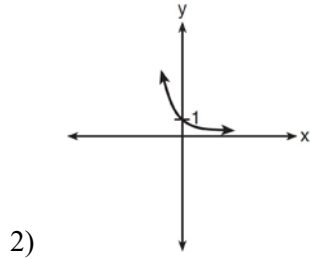
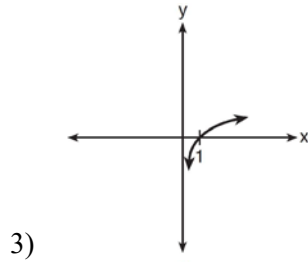
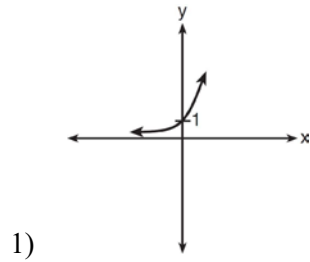
F.IF.C.7: Graphing Logarithmic Functions

- 1 For which value of x is $y = \log x$ undefined?
 - 1) 0
 - 2) $\frac{1}{10}$
 - 3) π
 - 4) 1.483
- 2 The asymptote of the graph of $f(x) = 5 \log(x + 4)$ is
 - 1) $y = 6$
 - 2) $x = -4$
 - 3) $x = 4$
 - 4) $y = 5$
- 3 The graph of $y = \log x$ lies in Quadrant(s)
 - 1) I and II
 - 2) II and III
 - 3) III and IV
 - 4) I and IV
- 4 Which statement about the graph of $c(x) = \log_6 x$ is *false*?
 - 1) The asymptote has equation $y = 0$.
 - 2) The graph has no y -intercept.
 - 3) The domain is the set of positive reals.
 - 4) The range is the set of all real numbers.
- 5 Which statement below about the graph of $f(x) = -\log(x + 4) + 2$ is true?
 - 1) $f(x)$ has a y -intercept at $(0, 2)$.
 - 2) $-f(x)$ has a y -intercept at $(0, 2)$.
 - 3) As $x \rightarrow \infty, f(x) \rightarrow \infty$.
 - 4) $x \rightarrow -4, f(x) \rightarrow \infty$.
- 6 If $f(x) = \log_3 x$ and $g(x)$ is the image of $f(x)$ after a translation five units to the left, which equation represents $g(x)$?
 - 1) $g(x) = \log_3(x + 5)$
 - 2) $g(x) = \log_3 x + 5$
 - 3) $g(x) = \log_3(x - 5)$
 - 4) $g(x) = \log_3 x - 5$
- 7 The graph of $y = \log_2 x$ is translated to the right 1 unit and down 1 unit. The coordinates of the x -intercept of the translated graph are
 - 1) $(0, 0)$
 - 2) $(1, 0)$
 - 3) $(2, 0)$
 - 4) $(3, 0)$
- 8 Which equation best represents the graph below?

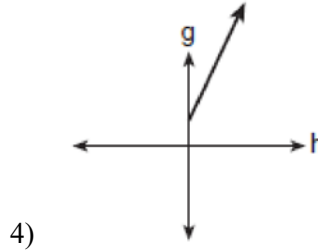
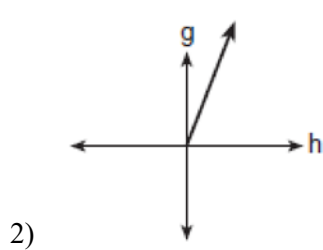
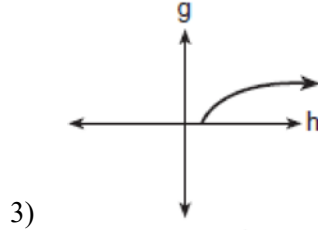
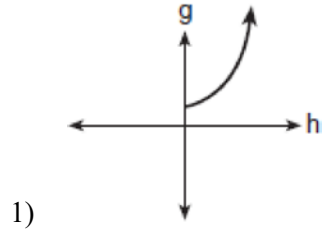


- 1) $h(x) = \log(x + a) + c$
- 2) $h(x) = \log(x - a) + c$
- 3) $h(x) = \log(x + a) - c$
- 4) $h(x) = \log(x - a) - c$

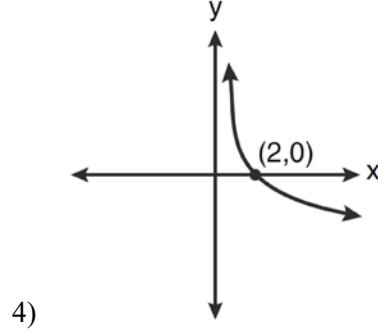
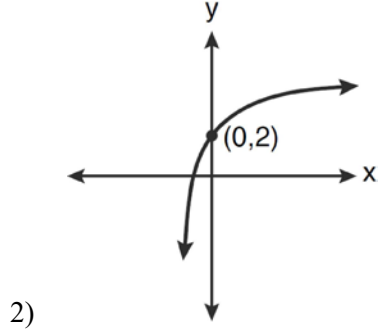
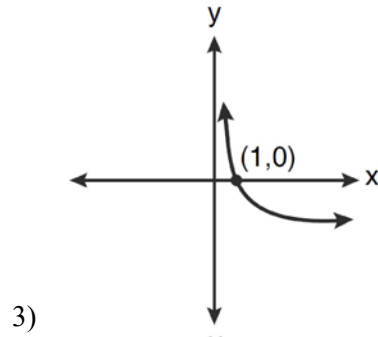
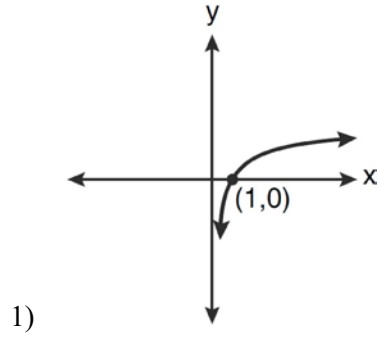
9 Which sketch shows the inverse of $y = a^x$, where $a > 1$?



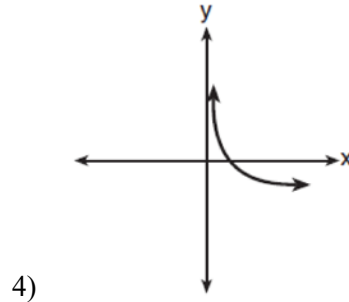
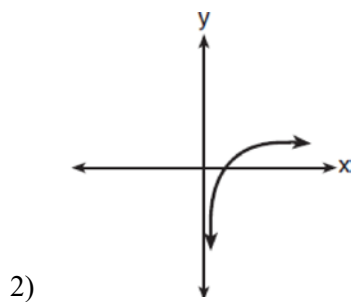
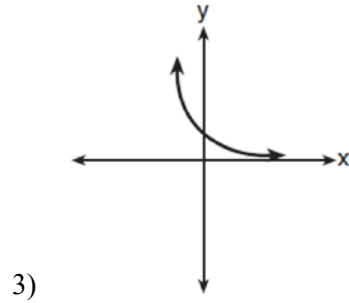
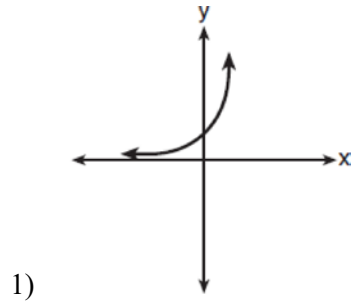
10 The cells of a particular organism increase logarithmically. If g represents cell growth and h represents time, in hours, which graph best represents the growth pattern of the cells of this organism?



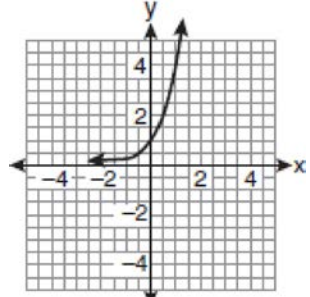
11 Which graph represents the function $\log_2 x = y$?



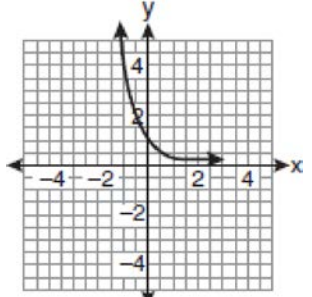
12 Which sketch best represents the graph of $x = 3^y$?



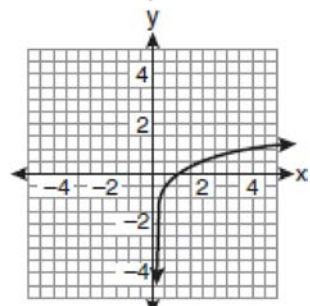
13 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?



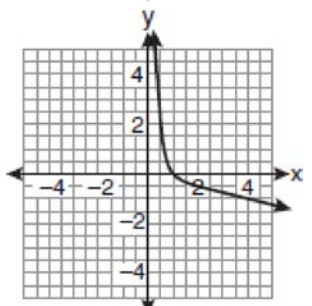
1)



3)

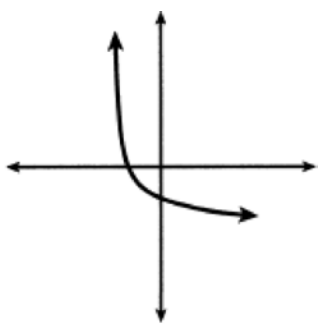


2)

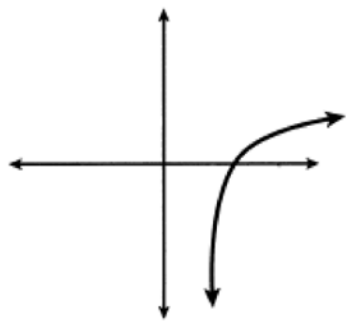


4)

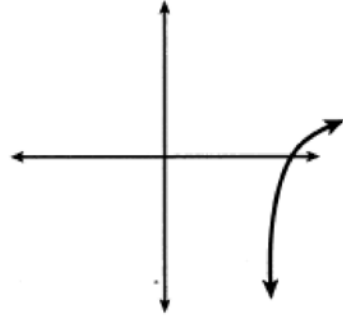
14 Which sketch could represent the function $m(x) = -\log_{100}(x - 2)$?



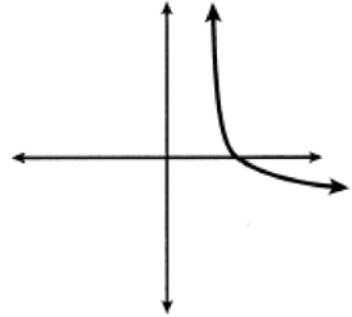
1)



3)

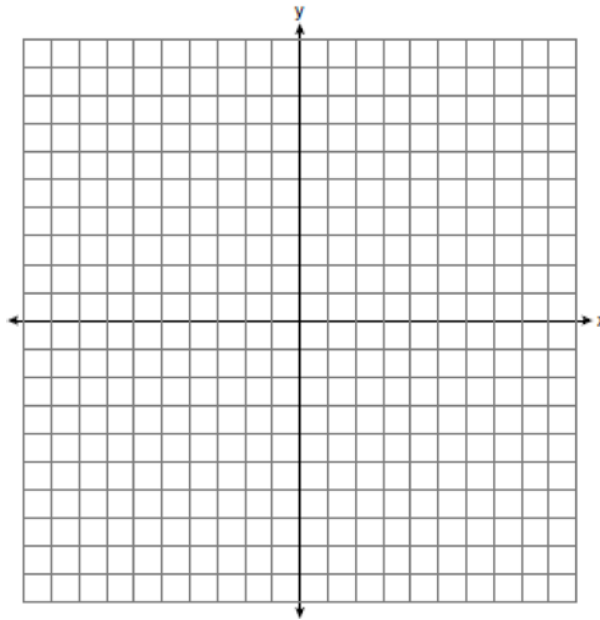


2)



4)

15 Sketch and label the graph of $y = 2^x$.



The graph of $y = 2^x$ is subject to each of these transformations:

- (1) reflection in the y -axis
- (2) reflection in the line $y = x$
- (3) translation: $(x,y) \rightarrow (x,y + 1)$

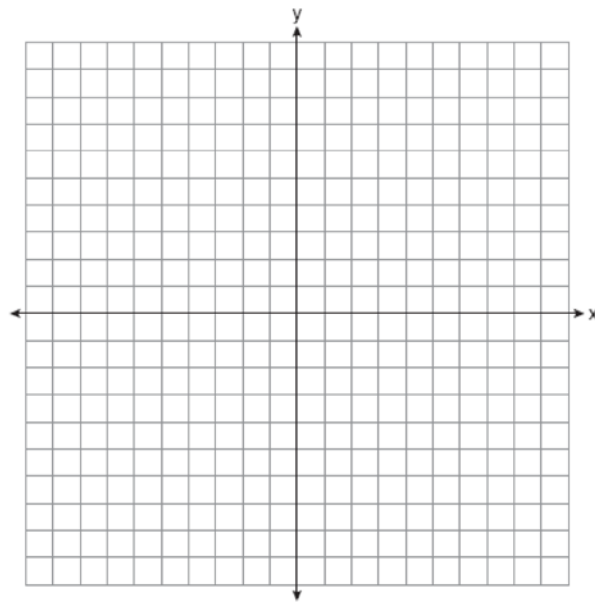
Next to the appropriate numeral below, write the letter of the equation, chosen from the list below, that best described the image of $y = 2^x$ under each of the numbered transformations.

Equations

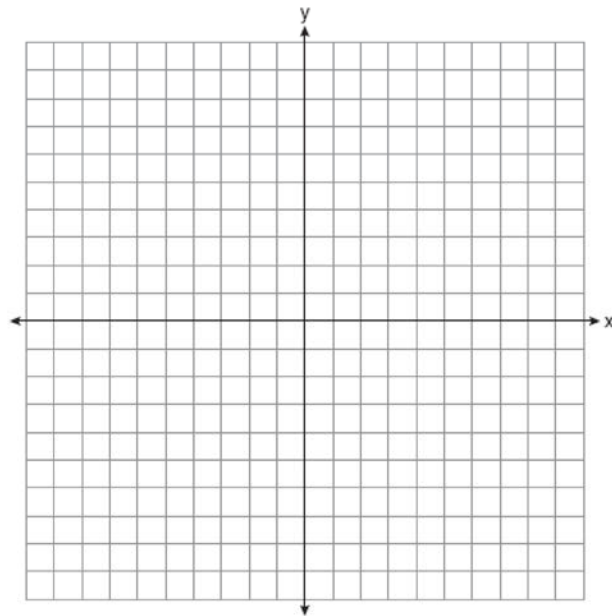
- (a) $y = \log_2 x$
- (b) $y = -2^x$
- (c) $y = 2^{-x}$
- (d) $y = 2^x + 1$

- (1)
- (2)
- (3)

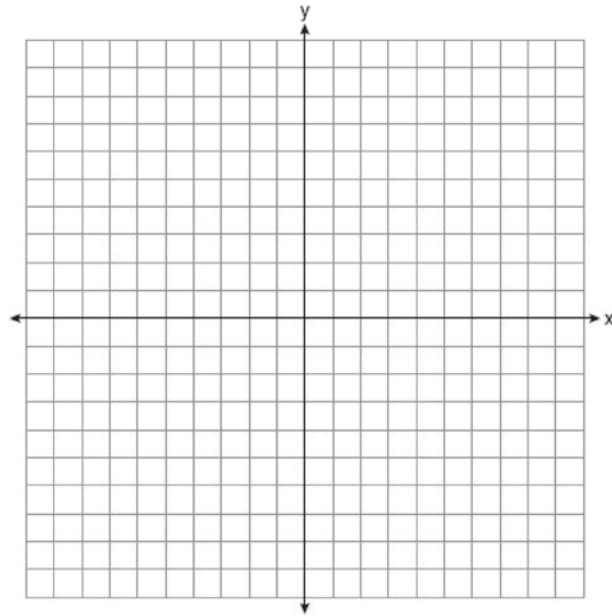
- 16 Sketch the graph of the functions $f(x) = 3^x$ and $g(x) = \log_3 x$. Considering the graphs, describe the relationship between $f(x)$ and $g(x)$. Specify the domain and the range of g .



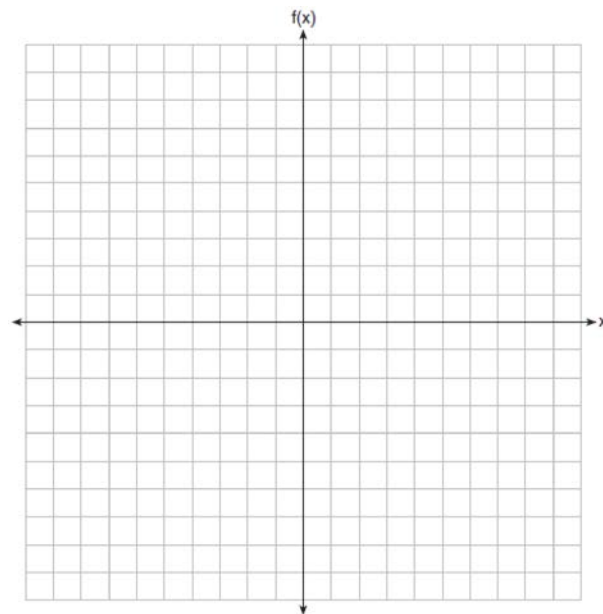
- 17 Sketch below the graph of $y = 4^x$. On the same set of axes, sketch the graph of $y = \log_4 x$.



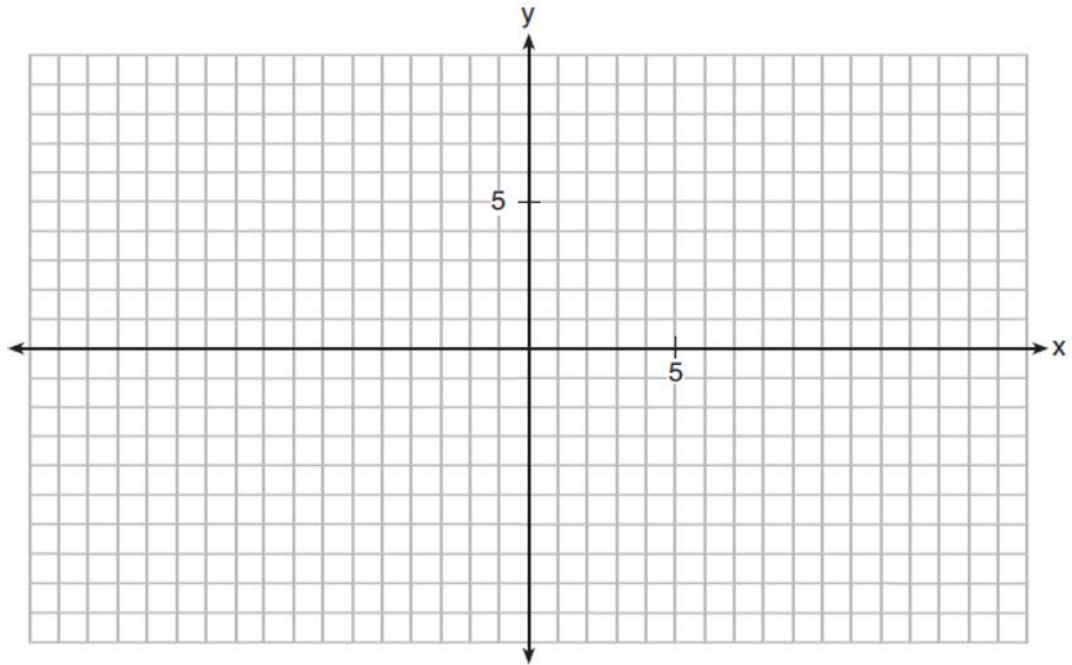
- 18 Sketch and label the graph of the equation $y = \log x$ for all values of x in the interval $0.1 \leq x \leq 10$. On the same set of axes, reflect the graph drawn in the line $y = x$, and label it c . What is the equation of c ?



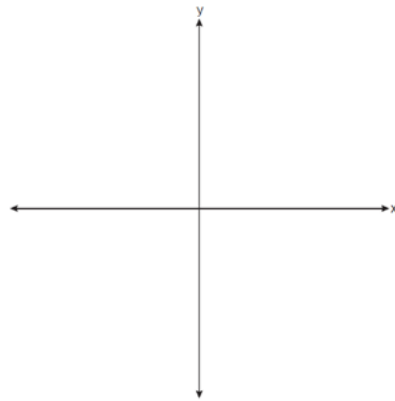
- 19 Graph $f(x) = \log_2(x + 6)$ on the set of axes below.



20 On the grid below, graph the function $y = \log_2(x - 3) + 1$

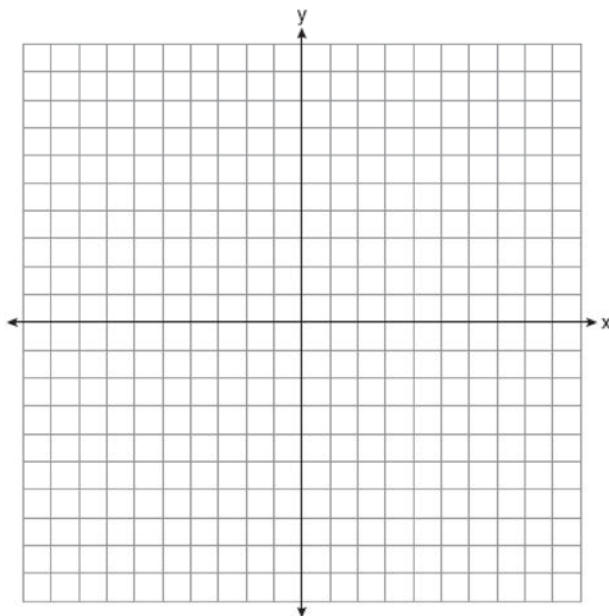


21 Sketch $p(x) = -\log_2(x + 3) + 2$ on the axes below.



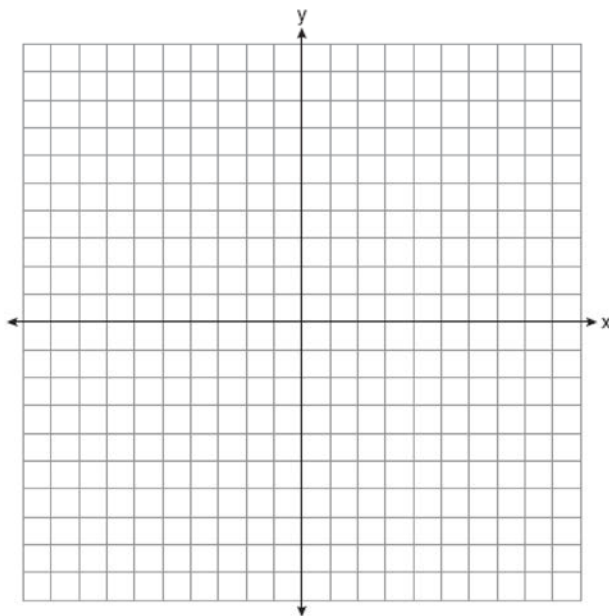
Describe the end behavior of $p(x)$ as $x \rightarrow -3$. Describe the end behavior of $p(x)$ as $x \rightarrow \infty$

22 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

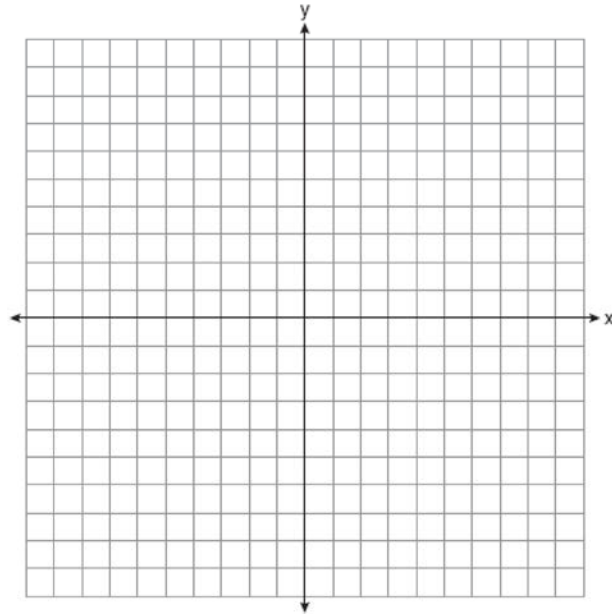
23 Graph $y = f(x)$, where $f(x) = \log_2(x - 1) + 3$ on the set of axes below.



State the equation of the asymptote of $f(x)$. When $f(x)$ is reflected over the line $y = x$, a new function is formed: $g(x) = 2^{x-3} + 1$. State the equation of the asymptote of $g(x)$.

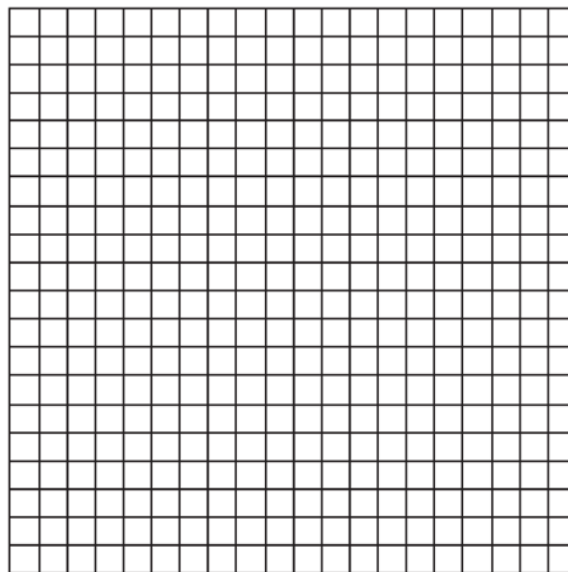
24 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



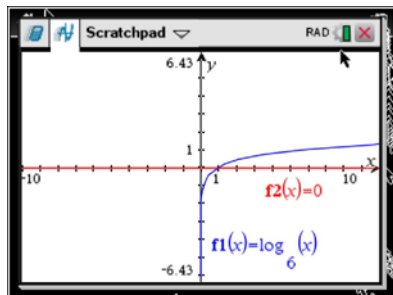
State the domain of f . State the equation of the asymptote.

25 A hotel finds that its total annual revenue and the number of rooms occupied daily by guests can best be modeled by the function $R = 3 \log(n^2 + 10n)$, $n > 0$, where R is the total annual revenue, in millions of dollars, and n is the number of rooms occupied daily by guests. The hotel needs an annual revenue of \$12 million to be profitable. Graph the function on the accompanying grid over the interval $0 < n \leq 100$. Calculate the minimum number of rooms that must be occupied daily to be profitable.



F.IF.C.7: Graphing Logarithmic Functions Answer Section

- 1 ANS: 1 REF: 060301b
 2 ANS: 2 REF: 082409aai
 3 ANS: 4 REF: 018535siii
 4 ANS: 1



REF: 061618aai

- 5 ANS: 4 REF: 062215aai
 6 ANS: 1 REF: 011902aai
 7 ANS: 4

$$\log_2(x - 1) - 1 = 0$$

$$\log_2(x - 1) = 1$$

$$x - 1 = 2^1$$

$$x = 3$$

REF: 061819aai

- 8 ANS: 1 REF: 062308aai
 9 ANS: 3 REF: 011422a2
 10 ANS: 3 REF: 010420b
 11 ANS: 1 REF: 061211a2
 12 ANS: 2 REF: 081816aai
 13 ANS: 2

$$f^{-1}(x) = \log_4 x$$

REF: fall0916a2

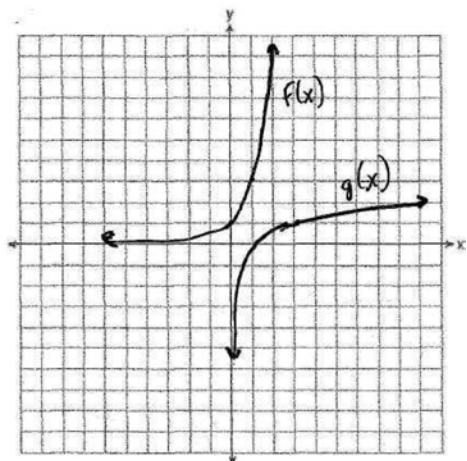
- 14 ANS: 4
 Translate the parent log function 2 to the right and reflect over the x -axis.

REF: 082207aai

- 15 ANS:
 c, a, d

REF: 088539siii

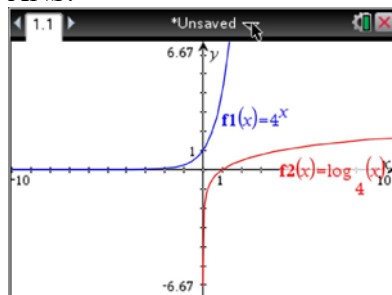
16 ANS:



$f(x)$ and $g(x)$ are inverses of each other. The domain of g is the positive reals and the range of g is the reals.

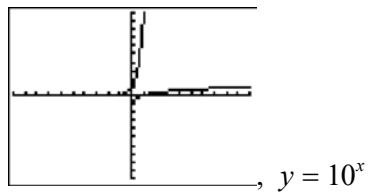
REF: fall9927b

17 ANS:



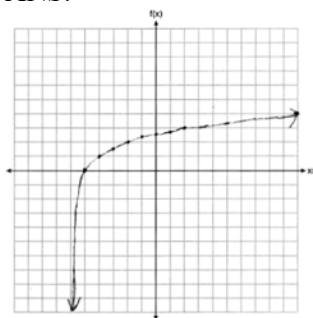
REF: 069039siii

18 ANS:



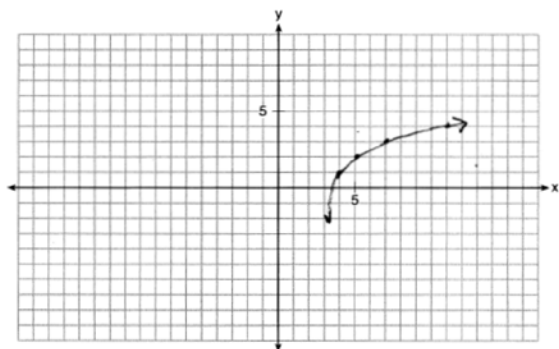
REF: 019442siii

19 ANS:



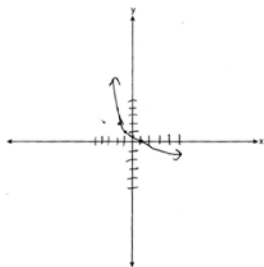
REF: 061927aia

20 ANS:



REF: 011932aia

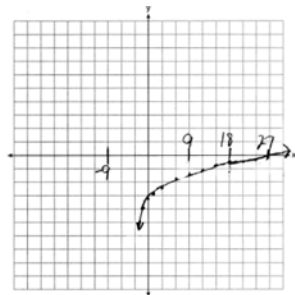
21 ANS:



As $x \rightarrow -3, y \rightarrow \infty$. As $x \rightarrow \infty, y \rightarrow -\infty$.

REF: 082333aia

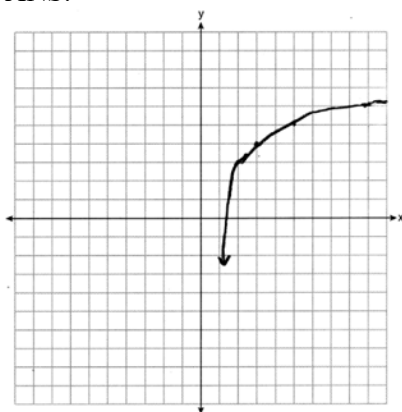
22 ANS:



As $x \rightarrow -3, y \rightarrow -\infty$. As $x \rightarrow \infty, y \rightarrow \infty$.

REF: 061735aia

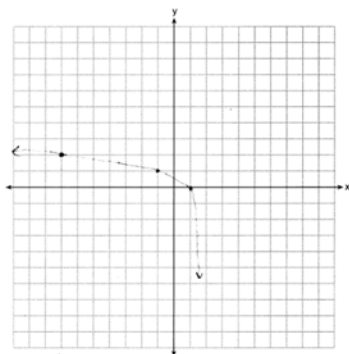
23 ANS:



$x = 1, y = 1$

REF: 062436aii

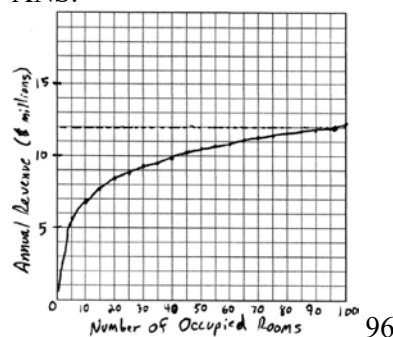
24 ANS:



Domain: $x < 2$, Asymptote $x = 2$

REF: 012034aii

25 ANS:



$$3 \log(m^2 + 10m) = 12$$

$$\log(m^2 + 10m) = 4$$

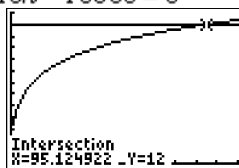
$$m^2 + 10m = 10^4$$

$$m^2 + 10m - 10000 = 0$$

$$x = \frac{-10 \pm \sqrt{10^2 - 4(-10000)}}{2}$$

$$x = \frac{-10 + \sqrt{40100}}{2} \approx 95.1$$

. 96 rooms must be



occupied. The other root is negative.

REF: 080530b