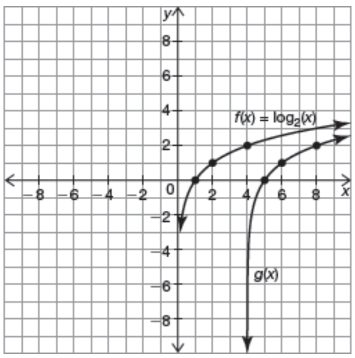
Name Key Date ____________ Period _____

12.5More Than Meets the Eye
Transformations of Logarithmic Functions

Analyze the graphs of $f(x)$ and $g(x)$. Describe the transformations performed on the graph of $f(x)$ to produce the graph of the transformed function $g(x)$. Then, write an equation for $g(x)$.

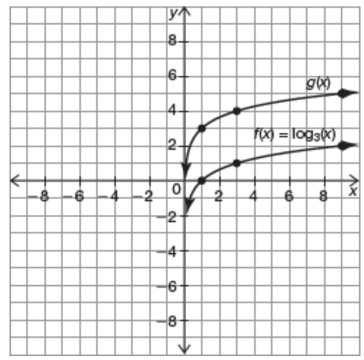
1.



The graph of $g(x)$ was horizontally translated right 4 units to produce the graph of $g(x)$.

$g(x) = \log_2 (x - 4)$

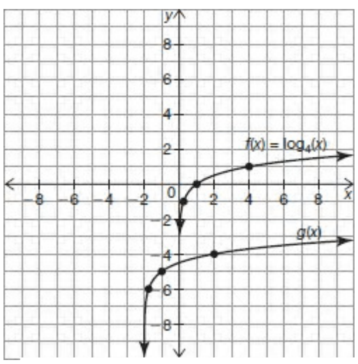
2.



The graph of $g(x)$ was vertically translated up 3 units to produce the graph of $g(x)$.

$g(x) = \log_3 (x) + 3$

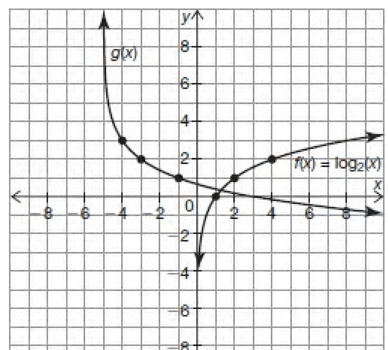
3.



The graph of $g(x)$ was horizontally translated left 2 units and vertically translated down 5 units to produce the graph of $g(x)$.

$g(x) = \log_4 (x + 2) - 5$

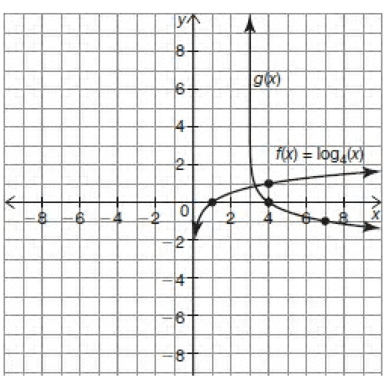
4.



The graph of $g(x)$ was reflected over the x-axis and horizontally translated up 3 units to produce the graph of $g(x)$.

$g(x) = -\log_2 (x + 5) + 3$

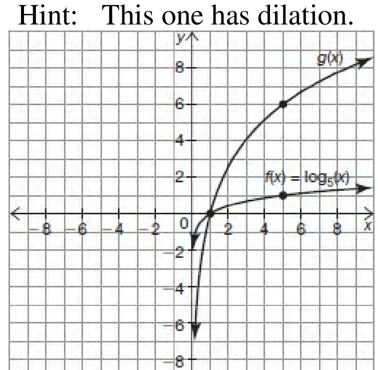
5.



The graph of $g(x)$ was reflected over the x-axis and horizontally translated right 3 units to produce the graph of $g(x)$.

$g(x) = -\log_4 (x - 3)$

6. Hint: This one has dilation.

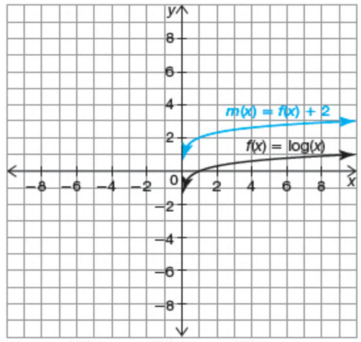


The graph of $g(x)$ was stretched vertically by a factor of 6 to produce the graph of $g(x)$.

$g(x) = 6 \log_5 (x)$

The graph of $f(x) = \log(x)$ is shown. Use the graph of $f(x)$ to sketch the transformed function $m(x)$ on the coordinate plane. Then, state the domain, range, transformed function and asymptotes of $m(x)$.

7. $m(x) = f(x) + 2.$



Domain of $m(x)$: $(0, \infty)$

Range of $m(x)$: $(-\infty, \infty)$

Asymptote of $m(x)$: $x = 0$

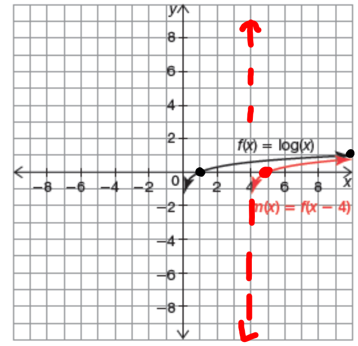
Transformed function:

$m(x) = \log x + 2$

End Behavior $m(x)$: $\lim_{x\to\infty} m(x) = \infty$

Asymptotic Behavior $m(x)$: $\lim_{x\to 0^+} m(x) = -\infty,$

8. $m(x) = f(x - 4).$



Domain of $m(x)$: $(4, \infty)$

Range of $m(x)$: $(-\infty, \infty)$

Asymptote of $m(x)$: $x = 4$

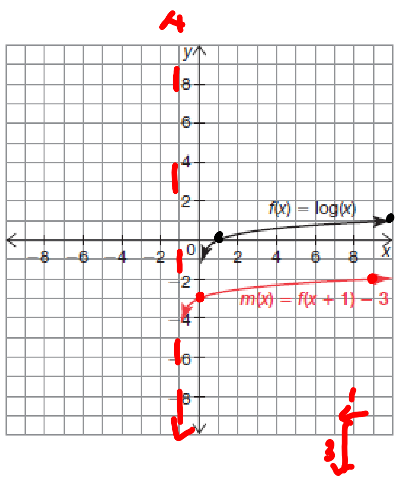
Transformed function:

$m(x) = \log(x-4)$ $\rightarrow 4$

End Behavior $m(x)$: $\lim_{x\to\infty} m(x) =$ $\underline{\infty}$

Asymptotic Behavior $m(x)$: $\lim_{x\to 4^+} m(x) =$ $\underline{-\infty}$

9. $m(x) = f(x + 1) - 3.$



Domain of $m(x)$: $(-1, \infty)$

Range of $m(x)$: $(-\infty, \infty)$

Asymptote of $m(x)$: $x = -1$

Transformed function:

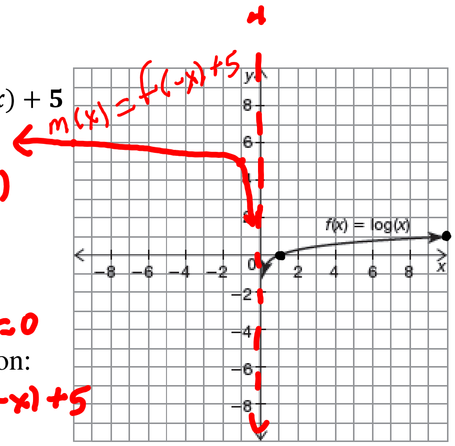
$m(x) = \log(x+1) - 3$

End Behavior $m(x)$:

$\lim_{x\to\infty} m(x) =$ $\underline{\infty}$

Asymptotic Behavior $m(x)$: $\lim_{x\to -1^+} m(x) =$ $\underline{-\infty}$

10. $m(x) = f(-x) + 5$



Domain of $m(x)$:

$(-\infty, \infty)$

Range of $m(x)$:

$(-\infty, \infty)$

Asymptote of $m(x)$:

$x = 0$

Transformed function:

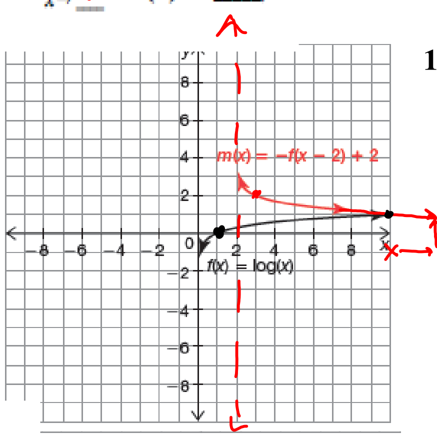
$m(x) = \log(-x) + 5$

End Behavior $m(x)$:

$\lim_{x\to\infty} m(x) =$ $\underline{\infty}$

Asymptotic Behavior $m(x)$: $\lim_{x\to 0^+} m(x) =$ $\underline{-\infty}$

11. $m(x) = -f(x - 2) + 2$



Domain of $m(x)$:

$(2, \infty)$

Range of $m(x)$:

$(-\infty, \infty)$

Asymptote of $m(x)$:

$x = 2$

Transformed function:

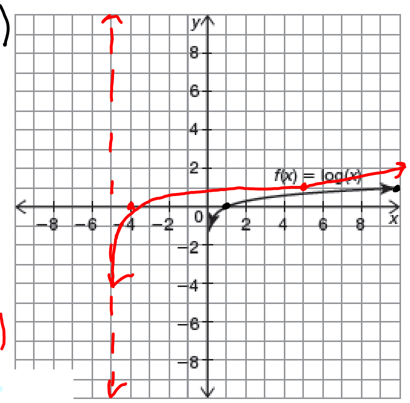
$m(x) = -\log(x-2) + 2$

End Behavior $m(x)$:

$\lim_{x\to\infty} m(x) =$ $\underline{-\infty}$

Asymptotic Behavior $m(x)$: $\lim_{x\to 2^+} m(x) =$ $\underline{+\infty}$

12. $m(x) = f(x+5)$



Domain of $m(x)$:

$(-5, \infty)$

Range of $m(x)$:

$(-\infty, \infty)$

Asymptote of $m(x)$:

$x = -5$

Transformed function:

$m(x) = \log(x+5)$

End Behavior $m(x)$:

$\lim_{x\to\infty} m(x) =$ $\underline{\infty}$

Asymptotic Behavior $m(x)$: $\lim_{x\to -5^+} m(x) =$ $\underline{-\infty}$

Write a transformed logarithmic function, $c(x)$, in terms of $f(x) = \log_2(x)$ with the characteristics given.

13. vertical asymptote at $x = 6$ Answers will vary.

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

14. domain of $(-\infty, 0)$

$c(x) = f(-x)$

15.

$(x, 3y)$

Reference Points on *f(x)*	→	**Corresponding Points on *c(x)***
$\frac{1}{2}, -1$	→	$\left(\frac{1}{2}, -3\right)$
(1, 0)	→	(1, 0)
(2, 1)	→	(2, 3)

$c(x) = 3f(x)$

16. vertical asymptote at $x = -2$

$c(x) = f(x + 2)$

17. domain of $(4, \infty)$

$c(x) = f(x - 4)$

18. vertical asymptote $x = 8$

$c(x) = f(x - 8)$

Consider the function $y = f(x)$ and the transformed function $g(x)$. Write an equation for $g^{-1}(x)$ in terms of $f^{-1}(x)$.

19. $g(x) = f(x) + 3$ $g^{-1}(x) = f^{-1}(x - 3)$

20. $g(x) = f(x - 2)$ [redacted]

21. $g(x) = f(x + 6)$ [redacted]

22. $g(x) = f(x) - 5$ [redacted]

23. $g(x) = f(x + 1) - 3$ [redacted]

24. $g(x) = f(x - 4) + 2$ [redacted]