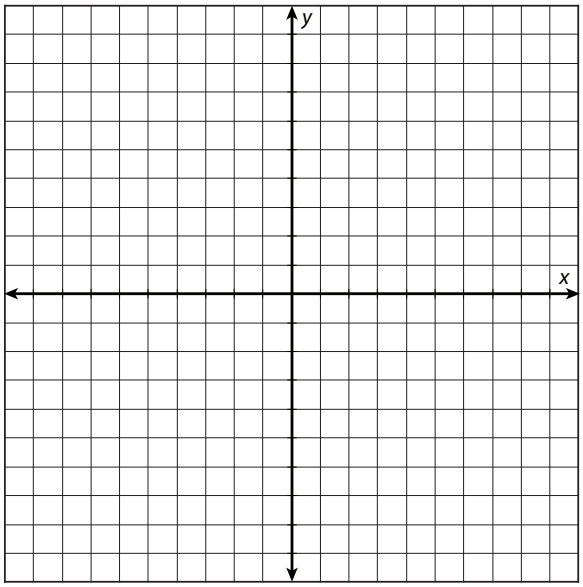
Name: **Date:**

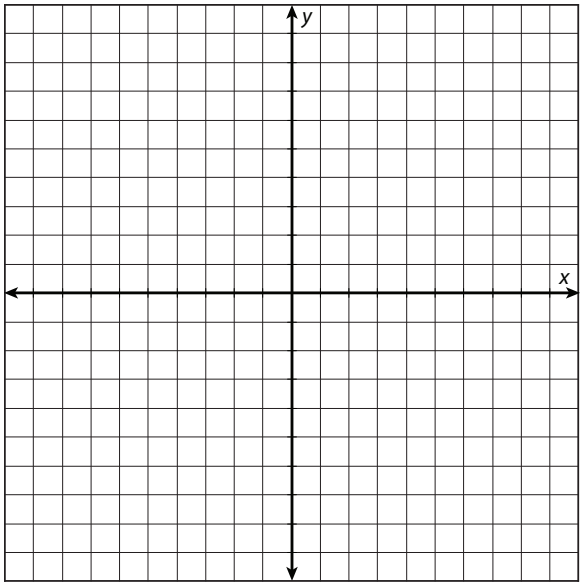
Practice: Graphing Logarithmic Functions A

For problems 1–4, sketch $f(x)$ and $g(x)$. Then, calculate the solution to the system of the two functions.

1. $f(x) = 1 + 2 \log_3 x$
   $g(x) = 2 - \log_3 x$



2. $f(x) = \log (x + 1)$
   $g(x) = \log (2 - x)$



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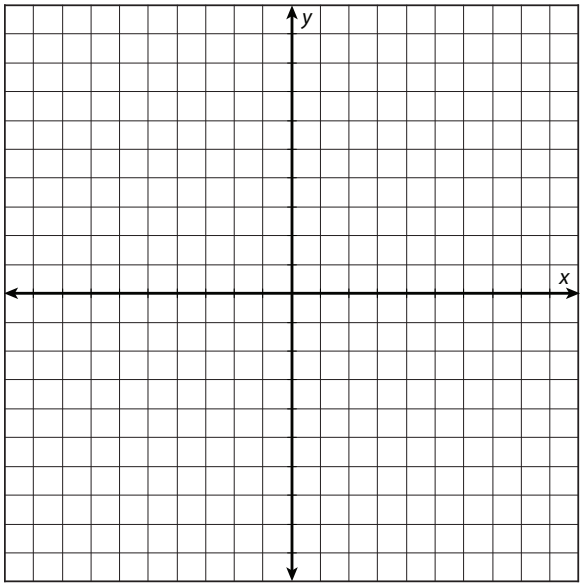
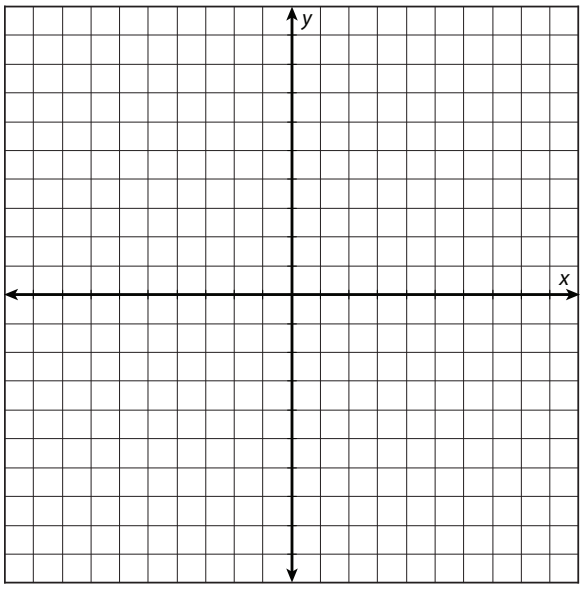
3. $f(x) = 3 \bullet \ln (x + 1)$
   $g(x) = 2 \bullet \ln (x - 1)$



4. $f(x) = \log_4 x^2$
   $g(x) = \log_4 (3x + 4)$



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For problems 5–7, compare the domains and ranges of the three functions in each problem. Then, state the domain(s) over which all three functions are defined.

5. $f(x) = 1 - \ln x$
   $g(x) = 1 - 2 \cdot \ln x$
   $h(x) = 2 - \ln x$

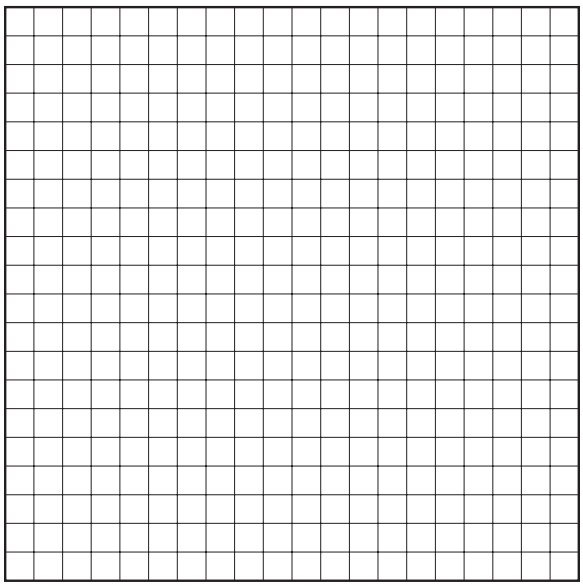
6. $f(x) = 2 \cdot \log (x - 1)$
   $g(x) = \log (x - 2)$
   $h(x) = \log (x + 1)$

7. $f(x) = 1 + 2 \cdot \log_3 (x + 4)$
   $g(x) = 2 + 4 \cdot \log_3 (x + 1)$
   $h(x) = 4 + \log_3 (x + 2)$

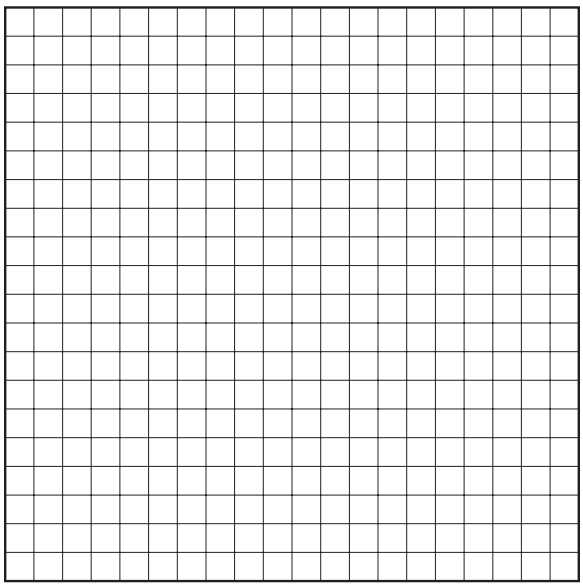
continued

For problems 8–10, use the information in each problem to sketch a graph of the given function on a coordinate plane. Be sure to label the axes so that all the real-world parts of the domain and range are evident. Then, use your graph to solve the problem.

8. The longevity of soy-based ink-jet cartridges at a public transportation ticket kiosk varies according to the logarithmic function $N(t) = 19 - 6 \bullet \ln t$, where t is the time in weeks and $N(t)$ is the number of cartridges used up during the time t. If the domain of the function is [2, 20], what is the range of the function? What kind of number is $N(t)$—a fraction, an integer, negative, positive?



9. The number of mechanical failures of a NASCAR stock car over the first 40 minutes of a race is modeled by the logarithmic function $F(t) = -1.5 + 0.9 \bullet \ln t$, where t is time in minutes. What is the minimum time elapsed after which a failure is predicted to occur according to this model?



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10. In a youth hockey league, the team score keeper found that the time $T(s)$ it takes a tied game to end with a winning score within 17 minutes of the overtime period is modeled by the function $T(s) = 17 - 11 \cdot \ln s$, in which s is the number of shots on goal taken by the winning team. What are the domain and range of the function?