Name: **Date:**

Scaffolded Practice: Interpreting Logarithmic Models

For problems 1–4, write the inverse function for each function described.

1. a function that describes the probability $P(n)$ of rolling a 1 n times in a row with a loaded (unfair) number cube with faces labeled 1 to 6 if the chance of rolling a 1 is two out of three

2. the pH of rainwater if the function is $\text{pH}(c) = -\log c$, where c is the number of hydronium ions in a rainwater sample

3. the decibel level $D(I)$ of a sound of intensity I if the function is $D(I) = 10 \bullet \log\left(\frac{I}{I_0}\right)$ and I_0 is a constant

4. the radioactivity level $R(t)$ after t years if the function is $\frac{R(t)}{R_0} = e^{-ct}$, in which R_0 and c are constants

For problems 5–8, state the domain of the function.

5. the voltage v in an electrical circuit if the function is $t(v) = 0.024 \bullet \log (1 - 0.2v)^{-4}$, where $t(v)$ is the rise time of the circuit voltage

6. the work $W(v)$ done by a piston as the volume v of the combustion chamber of the piston changes if the function is $W(v) = nRT \bullet \ln\left(\frac{v}{v_i}\right)$, in which n, R, T, and v_i are constants

7. the probability $P(n)$ that the number 7 will come up n times in a row on a spinner divided into seven equal-size sections numbered from 1 through 7

8. the number $n(t)$ of deer in a herd if t is the time in months shown in the table:

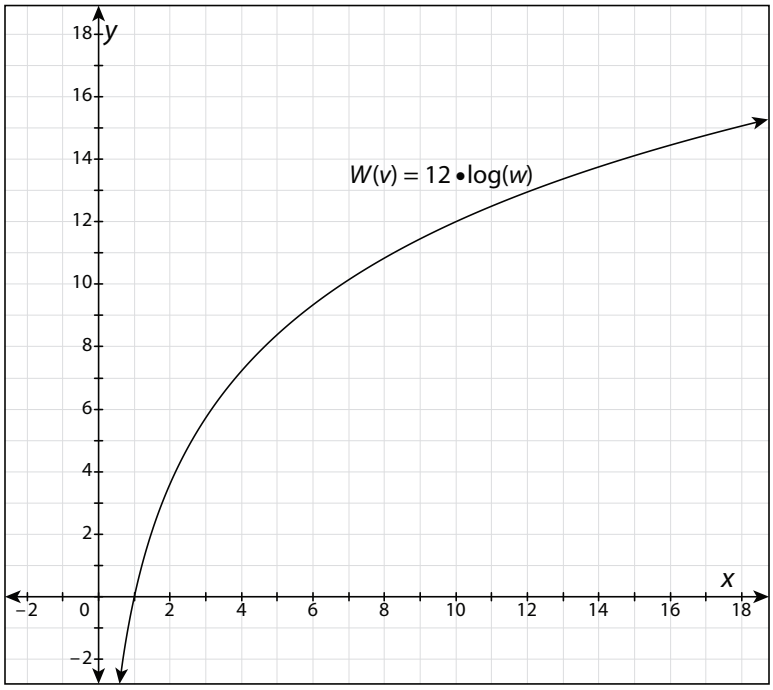
Time in months	6	12	18	24	36	48	60
Number of deer	3	5	12	20	42	75	120

continued

Name: **Date:**

Use the given information to complete the following problems.

9. In vehicles with air brakes, braking is caused by compressed air in a chamber pressing on a piston that is connected to the brake pad. The graph shows the value of the work function $W(v) = nRT \bullet \ln\left(\frac{v}{v_i}\right)$ for an air brake as the volume of air in its compression chamber v changes. What is the relationship of v to the initial volume v_i over the domain (0, 1), when $W(v) = 0$, and over the domain $(1, +\infty)$?



10. The pH function for a sample of liquid is pH(c) = –log c, where c is the concentration of hydronium ions in the sample. The range of pH values is given by the interval (0, 14]. What is the value of c when the pH is 5? When the pH is 7? When the pH is 10? What is the domain of the pH function for the range (0, 14]?