Name: **Date:**

Practice: Interpreting Logarithmic Models B

Use the following information to complete problems 1–4.

> An air-quality sampling project around the salt marshes along the Massachusetts coast over a 5-year period revealed an increase in the quantities of methane and other gases. This increase implies a decrease in oxygen-producing plants, including grasses and other marsh vegetation. A staff scientist with the state environmental protection department came up with a logarithmic-function model $A(t) = 475 - 85 \cdot \ln t$ that describes the decreasing acreage of such oxygen-producing plants, based on the increased amount of the other gases over the 5-year period with t measured in months.

1. What does the function value $A(1)$ represent in this problem?

2. What is the domain of the function?

3. How many months does the model predict it will take for the plant acreage to be reduced by half of the amount measured from the end of the first month ($t = 1$) of the study?

4. Explain the validity of the model based on the results of problem 3.

Use the given information to complete problem 5.

5. A smelting factory installed "scrubbers" to reduce the amount of acidic particulate matter (dust) being released into the air. A chemist measured the change in rainwater acidity for 6 months following the installation of the scrubbers. Before the scrubbers were installed, the average pH of the rainwater in the area was 6.15. After the scrubbers were installed, the average pH of the rainwater increased to 6.9. By what percentage did the concentration of acid-producing substances decrease to account for this change in pH? The equation for pH is $\text{pH} = -\log c$, where c is the concentration of acid-producing substances.

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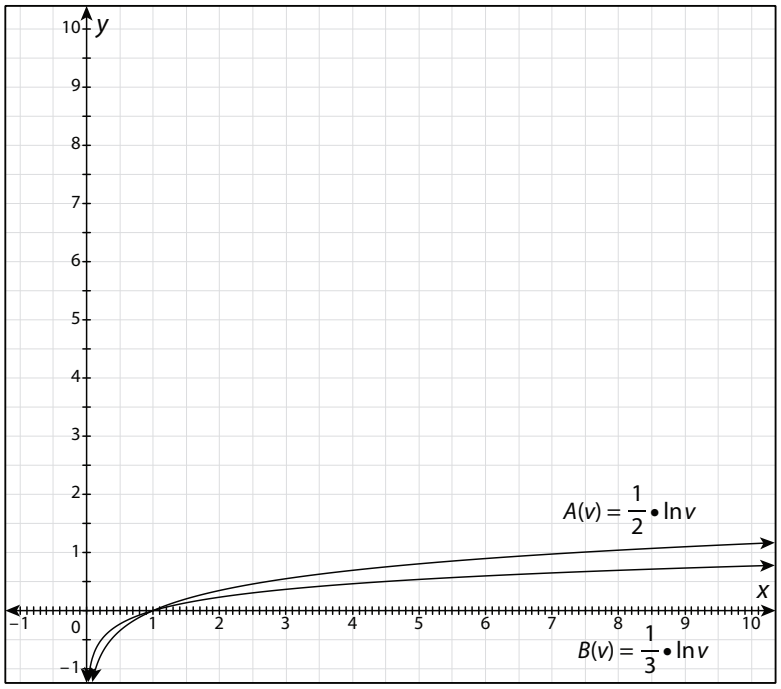
Use the graph and the given information to complete the problems that follow.

In vehicles with air brakes, braking is caused by compressed air in a chamber pressing on a piston that's connected to the brake pad. The following graph shows the work $W(v)$ done by the air brakes on a commuter-rail train coach at two different operating temperatures, $A(v) = \frac{1}{2} \bullet \ln v$ and $B(v) = \frac{1}{3} \bullet \ln v$, where v is the volume of air in the compression chamber.



6. Draw a horizontal line connecting the graphed curves.

7. What does the horizontal line represent?

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8. Without using a calculator, find the volumes of the brake air-compression chamber that correspond to a function value of 0.3 for each function.

9. Write the volume of function $B(v)$ in terms of the volume of function $A(v)$.

10. What do you notice about the exponent of e in the answer to problem 9 in comparison to the value of the work performed?