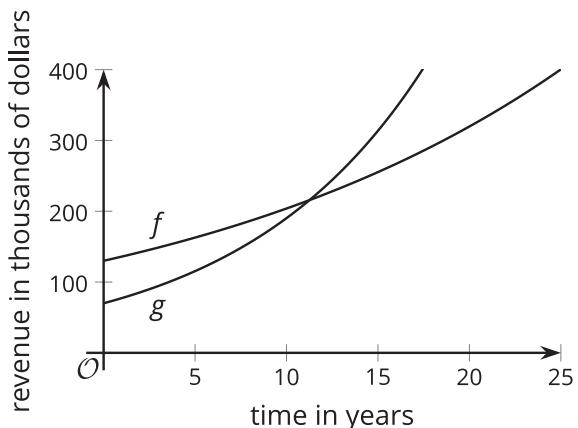


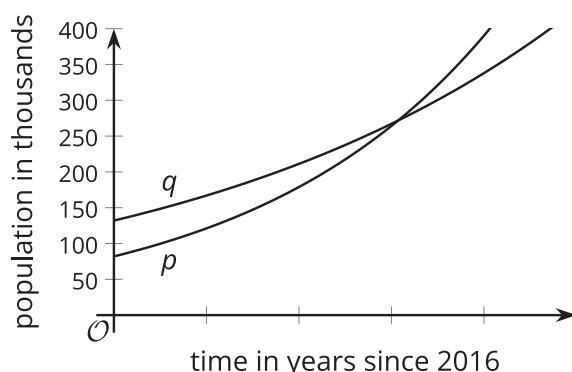
Lesson 16 Practice Problems

1. The revenues of two companies can be modeled with exponential functions f and g . Here are the graphs of the two functions. In each function, the revenue is in thousands of dollars and time, t , is measured in years. The y -coordinate of the intersection is 215.7. Select all statements that correctly describe what the two graphs reveal about the revenues.



- A. The intersection of the graphs tells us when the revenues of the two companies grow by the same factor.
- B. The intersection tells us when the two companies have the same revenue.
- C. At the intersection, $f(t) > g(t)$.
- D. At the intersection, $f(t) = 215.7$ and $g(t) = 215.7$.
- E. We need to know both expressions that define f and g to find the value of t at the intersection.
- F. If we know at least one of the expressions that define f and g , we can calculate the value of t at the intersection.

2. The population of a fast-growing city in Texas can be modeled with the equation $p(t) = 82 \cdot e^{(0.078t)}$. The population of a fast-growing city in Tennessee can be modeled with $q(t) = 132 \cdot e^{(0.047t)}$. In both equations, t represents years since 2016 and the population is measured in thousands. The graphs representing the two functions are shown. The point where the two graphs intersect has a y -coordinate of about 271.7.



- a. What does the intersection mean in this situation?
- b. Find the x -coordinate of the intersection point by solving each equation. Show your reasoning.
- $p(t) = 271.7$
 - $q(t) = 271.7$
- c. Explain why we can find out the t value at the intersection of the two graphs by solving $p(t) = q(t)$.

3. The function f is given by $f(x) = 100 \cdot 3^x$. Select all equations whose graph meets the graph of f for a positive value of x .

- A. $y = 10 \cdot e^x$
- B. $y = 500 \cdot e^x$
- C. $y = 500 \cdot e^{-x}$
- D. $y = 1,000 \cdot 2^x$
- E. $y = 600 \cdot 10^x$

4. The half-life of nickel-63 is 100 years. A student says, "An artifact with nickel-63 in it will lose a quarter of that substance in 50 years."

Do you agree with this statement? Explain your reasoning.

(From Unit 4, Lesson 7.)

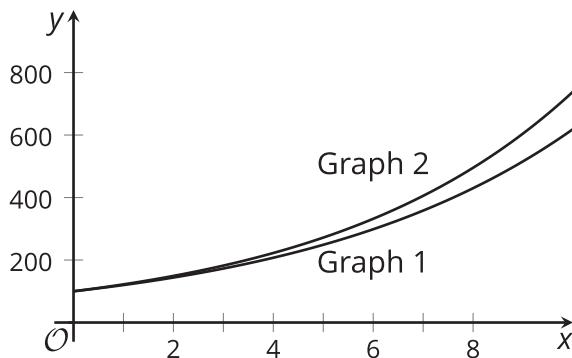
5. *Technology required.* Estimate the value of each expression and record it. Then, use a calculator to find its value and record it.

expression	estimate	calculator value
$\log 123$		
$\log 110,000$		
$\log 1.1$		

(From Unit 4, Lesson 11.)

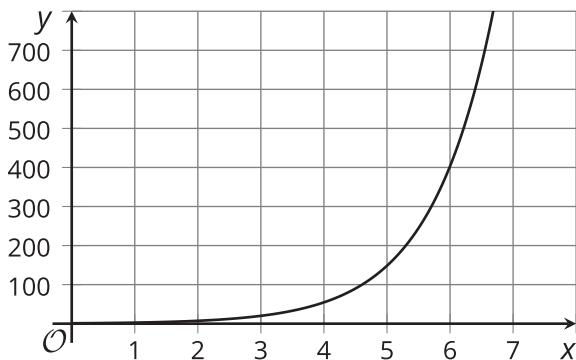
6. Here are graphs of the functions f and g given by $f(x) = 100 \cdot (1.2)^x$ and $g(x) = 100 \cdot e^{0.2x}$.

Which graph corresponds to each function? Explain how you know.



(From Unit 4, Lesson 13.)

7. Here is a graph that represents $f(x) = e^x$.



Explain how we can use the graph to estimate:

- The solution to an equation such as $300 = e^x$.
- The value of $\ln 700$.

(From Unit 4, Lesson 15.)