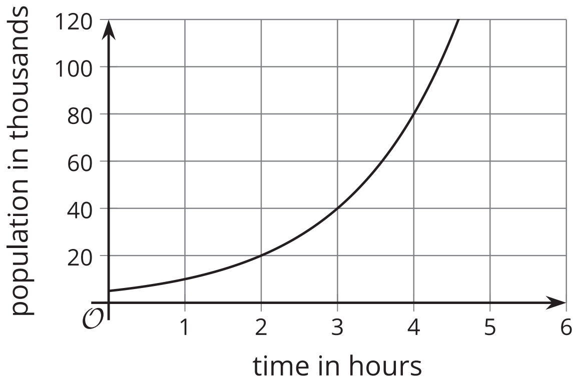
Lesson 15 Practice Problems

1. The equation $p(h) = 5{,}000 \cdot 2^h$ represents a bacteria population as a function of time in hours. Here is a graph of the function p.



   a. Use the graph to determine when the population will reach 100,000.

   b. Explain why $\log_2 20$ also tells us when the population will reach 100,000.

2. *Technology required.* Population growth in the U.S. between 1800 and 1850, in millions, can be represented by the function f, defined by $f(t) = 5 \cdot e^{(0.028t)}$.

   a. What was the U.S. population in 1800?

   b. Use graphing technology to graph the equations $y = f(t)$ and $y = 20$. Adjust the graphing window to the following boundaries: $0 < x < 100$ and $0 < y < 40$.

   c. What is the point of intersection of the two graphs, and what does it mean in this situation?

3. The growth of a bacteria population is modeled by the equation $p(h) = 1{,}000e^{(0.4h)}$. For each question, explain or show how you know.

    a. How long does it take for the population to double?

    b. How long does it take for the population to reach 1,000,000?

4. What value of b makes each equation true?

    a. $\log_b 144 = 2$

    b. $\log_b 64 = 2$

    c. $\log_b 64 = 3$

    d. $\log_b 64 = 6$

    e. $\log_b \frac{1}{9} = -2$

    (From Unit 4, Lesson 10.)

5. Put the following expressions in order, from least to greatest.

    $\log_2 11 \quad \log_3 5 \quad \log_5 25 \quad \log_{10} 1{,}000 \log_2 5$

    (From Unit 4, Lesson 11.)

6. Solve $9 \cdot 10^{(0.2t)} = 900$. Show your reasoning.

(From Unit 4, Lesson 14.)

7. Explain why $\ln 4$ is greater than 1 but is less than 2.

(From Unit 4, Lesson 14.)