

Logarithmic Functions P-Set

Re-write each as a logarithmic expression.

1. $2^5 = 32$

2. $3^{-4} = \frac{1}{81}$

3. $81^{3/4} = 27$

4. $e^0 = 1$

Use the properties of logarithms to rewrite each of the following.

5. $\log_2\left(\frac{3}{5}\right)$

6. $\log(8 \cdot 20)$

7. $\ln(\sqrt{26})$

8. $\log_6\left(\frac{4}{7}\right)$

9. $\log(17 \cdot 11)$

10. $\ln(\sqrt[3]{11})$

The number of bacteria in a petri dish can be modeled by the formula $A = A_0 e^{kt}$, where

- A is the number of bacteria present at any moment in time
 - A_0 is the number of bacteria at the start ($t = 0$)
 - k is a constant
 - t is the time (in minutes)
11. Suppose there are 10,000 bacteria initially present and after 3 minutes, the bacteria count is now 25,000. Find the value of k . Round to 3 decimal places.
12. Using your answer for k above, how long will it take a colony of 10,000 bacteria to grow to a size of 100,000?
13. How long until the bacteria population reaches 1,000,000?

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Key

1. $\log_2(32) = 5$

2. $\log_3\left(\frac{1}{81}\right) = -4$

3. $\log_{81}(27) = \frac{3}{4}$

4. $\ln(1) = 0$

5. $\log_2(3) - \log_2(5)$

6. $\log(8) + \log(20)$

7. $\frac{1}{2} \ln(26)$

8. $\log_6(4) - \log_6(7)$

9. $\log(17) + \log(11)$

10. $\frac{1}{3} \ln(11)$

11. $k \approx 0.305$

12. About 7.55 minutes

13. About 15.10 minutes