

10-5 Natural Logarithms Worksheet

Use a calculator to evaluate each expression to four decimal places.

1. e^3

2. e^{-2}

3. $\ln 2$

4. $\ln 0.09$

Write an equivalent exponential or logarithmic equation.

5. $e^x = 3$

6. $e^4 = 8x$

7. $\ln 15 = x$

8. $\ln x \approx 0.6931$

Evaluate each expression.

9. $e^{\ln 3}$

10. $e^{\ln 2x}$

11. $\ln e^{-2.5}$

12. $\ln e^y$

Solve each equation.

15. $2e^x - 1 = 11$

17. $e^{3x} = 30$

21. $\ln 3x = 2$

20. $1 - 2e^{2x} = -19$

23. $\ln(x - 2) = 2$

26. $\ln x + \ln 2x = 2$

POPULATION In 2005, the world's population was about 6.5 billion. If the world's population continues to grow at a constant rate, the future population P , in billions, can be predicted by $P = 6.5e^{0.02t}$, where t is the time in years since 2005.

a. According to this model, what will the world's population be in 2015?

b. Some experts have estimated that the world's food supply can support a population of at most 18 billion. According to this model, for how many more years will the food supply be able to support the trend in world population growth?

Common Logs

Use a calculator to evaluate each expression to four decimal places.

1. $\log 6$

2. $\log 15$

3. $\log 1.1$

4. $\log 0.3$

Use the formula $\text{pH} = -\log[H^+]$ to find the pH of each substance given its concentration of hydrogen ions.

5. gastric juices: $[H^+] = 1.0 \times 10^{-1}$ mole per liter

6. tomato juice: $[H^+] = 7.94 \times 10^{-5}$ mole per liter

7. blood: $[H^+] = 3.98 \times 10^{-8}$ mole per liter

8. toothpaste: $[H^+] = 1.26 \times 10^{-10}$ mole per liter