

1.	Find the logarithm. $\log_{38} 1$	$\log_{38} 1 = \square$	68
2.	Write as an equivalent logarithmic equation. $10^3 = 1000$	The equation is $\log(\square) = \square$.	
3.	Convert to a logarithmic equation. $64^{1/3} = 4$	Complete the equivalent logarithmic equation. $\log_{64} \square = \square$ (Type integers or fractions.)	
4.	Convert to a logarithmic equation. $e^{-4} = 0.0183$	The equivalent logarithmic equation is $\ln \square = \square$.	
5.	Convert to an exponential equation. $4 = \log_2 16$	Complete the equivalent exponential equation. $\square = 16$ (Simplify your answer. Type in exponential form.)	
6.	Convert to an exponential equation. $\log 0.1 = -1$	The equivalent exponential equation is $\square = 0.1$.	
7.	Convert to an exponential equation. $\ln 91 = 4.5109$	The equivalent exponential equation is $\square = 91$.	
8.	Use a calculator to find the common logarithm. $\log 0.131$ Select the correct choice below and fill in any answer boxes within your choice. ☐ A. The answer is $\square$. (Round to four decimal places.) ☐ B. The solution does not exist.		

9.

Use a calculator to find the common logarithm.

$$\log (-84)$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The answer is .
- ☐ B. The answer does not exist.

(Round to 4 decimal places.)

10. Use a calculator to find the natural logarithm, base e .

$\ln 94$

Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. $\ln 94 = \square$
(Simplify your answer. Type an integer or a decimal. Round to 4 decimal places.)
- ☐ B. The solution does not exist.

11.	Find the logarithm using the change of base formula. $\log_2 18 = \square$ (Round to four decimal places as needed.)	$\log_2 18$
12.	Find the logarithm using the change of base formula. $\log_9 0.02 = \square$ (Round to four decimal places as needed.)	$\log_9 0.02$

13.	Graph both functions using the same set of axes. $f(x) = 5^x$, $f^{-1}(x) = \log_5 x$ Choose the correct graph. $f(x) = 5^x$ is the solid red line. $f^{-1}(x) = \log_5 x$ is the dashed blue line.	☐ A. ☐ B. ☐ C. ☐ D.
14.	Sketch the graph of the function $f(x) = \ln x - 1$ by transforming the graph of $f(x) = \ln x$. Graph the function using a graphing calculator. Find the domain and vertical asymptote.	☐ A. ☐ B. ☐ C. ☐ D.

Choose the correct graph.	☐ A. ☐ B. ☐ C. ☐ D.
All graphs are $[-10, 10, -10, 10]$ $X_{\text{sc1}} = 1$, $Y_{\text{sc1}} = 1$.	
What is the domain?	
(Type your answer in interval notation.)	
The vertical asymptote is $x = \square$.	

15. Walking speed. The average walking speed R of a person living in a city of population P in thousands is modeled by the function, $R(P) = 0.37 \cdot \ln P + 0.05$, where R is in feet per second. The population of Tulsa is 374,000. Find the average walking speed of people living in Tulsa.

The average walking speed is $\frac{\text{ft}}{\text{sec}}$.

(Round to the nearest tenth.)

16. The pH of a fruit juice is 2.9. Find the hydronium ion concentration, $[\text{H}_3\text{O}^+]$, of the juice. Use the formula $\text{pH} = -\log [\text{H}_3\text{O}^+]$.

The hydronium ion concentration $[\text{H}_3\text{O}^+]$ is approximately moles per liter.

(Use scientific notation. Use the multiplication symbol in the math palette as needed. Round to the nearest tenth as needed.)

17. Express as a sum of logarithms.

$$\log_6(39 \cdot 10)$$

$$\log_6(39 \cdot 10) = \text{$$

18. Express as a product.

$$\log_B(x^3)$$

$$\log_B(x^3) = \text{$$

19. Express $\log_b \frac{m}{t}$ as a difference of logarithms.

Which expression is correct?

☐ A. $\log_b \frac{m}{t} = \log_b m \cdot \log_b t$

☐ B. $\log_b \frac{m}{t} = \log_b m - \log_b t$

☐ C. $\log_b \frac{m}{t} = \frac{\log_b m}{\log_b t}$

☐ D. $\log_b \frac{m}{t} = \log_b t - \log_b m$

20.

Express $\log_b \frac{x y^4}{w^3 z}$ as a sum and/or difference of logarithms.

Which expression is correct?

- ☐ A. $\log_b 4 + \log_b xy - \log_b 3 + \log_b y + \log_b z$
- ☐ B. $4 \log_b xy - 3 \log_b w + \log_b z$
- ☐ C. $\log_b 4xy - \log_b 3w - \log_b z$
- ☐ D. $\log_b x + 4 \log_b y - 3 \log_b w - \log_b z$

21.

Express as a sum or difference of logarithms without exponents.

$$\log_{c9} \sqrt[4]{\frac{x}{y^9 z^5}}$$

What is the equivalent sum or difference of logarithms?

☐

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

22.	Express as a single logarithm and, if possible, simplify. $\log 1,000,000 - \log 100,000$	$\log 1,000,000 - \log 100,000$ $= \log \square$ (Simplify your answer.) $= \square$ (Simplify your answer.)
23.	Express as a single logarithm and, if possible, simplify. $\ln x^5 - 3 \ln \sqrt[3]{x^2}$	
	$\ln x^5 - 3 \ln \sqrt[3]{x^2} = \square$ (Simplify your answer.)	

Use $\log_b 6 = 1.792$ and/or $\log_b 7 = 1.946$ to find $\log_b \frac{6}{7}$.

24.
(cont.) $\log_b \frac{6}{7} = \square$

25. Simplify.

$$e^{\ln t}$$

$$e^{\ln t} = \square$$
