

Exponential and Logarithmic Functions Review

- Determine the domain of $y = \log(x + 1)$
 - Determine an equivalent, expanded and simplified expression for $\log \frac{100a^2}{\sqrt{b}}$
 - Evaluate: $\log_{\sqrt{7}} 7^3$
 - As an iceberg melts during the summer, it loses 3% of its mass every 5 days. This iceberg reduces to 40% of its original mass after t days. Write an exponential equation to model this situation.
 - Solve: $\log_2(\log_9 x) = -1$
 - Solve: $5^{x+1} = 2(3^{2x})$
 - Change to logarithmic form: $a^3 = b$
 - Describe the transformations that transform the graph of $y = 5^x$ to the graph of $y = -5^{2x+3} - 10$.
 - Determine the magnitude of an earthquake that is half as intense as an earthquake of magnitude 8.0 on the Richter scale.
 - Solve algebraically: $\log 2 - \log(x + 1) = \log(x + 1) - \log(x + 17)$
 - Change $\log_a p = t$ to exponential form.
 - Determine a simplified expression for: $\log a + 2\log b - 3\log c$
 - Solve algebraically: $\log_5(3x) - \log_5(x - 3) = 2$
 - Solve: $9_{x+2} = (3_{4x-3})(3_5)$
 - If $x = \log_5 3$ and $y = \log_5 4$, express $\log_5 144$ in terms of x and y .
 - What equation represents the graph of $y = 2^x$ after it is reflected in the x -axis?
 - A ball is dropped from a height of 4 m. After each bounce, the ball rises to 70% of its previous height. What is the maximum height the ball will reach after it hits the ground for the 5th time?
 - What transformations map the graph of $y = \log_{16} x$ to the graph of $y = 5 \log_{16}(4 - x)$?
 - Determine the domain, range, any intercepts, and the equations of any asymptotes for:
 - $y = -2^{x-5} + 7$
 - $y = 2 \log_3(2x - 4) - 3$Then graph each function using transformations.
 - A pH of 5 is 10 times more acidic than a pH of 6. Solution A has a pH of 5.7. Solution B is 1260 times more acidic than solution A. Find the pH of solution B.
 - A radioactive substance has a half-life of 17 d. How long will it take for 300 g of this substance to decay to 95 g? [solve algebraically]
 - If the function $y = 3^x$ is expanded vertically by a factor of 9 to produce a new function, write an equation of the new function in the form $y = 3^{x+k}$.
 - A particular type of bacteria multiplies 5-fold every 30 minutes. Initially there are 100 bacteria. Determine an expression for the number of bacteria after k minutes.
 - Given $f(x) = 2^x + 5$, determine an equation for $f^{-1}(x)$, the inverse of $f(x)$.
 - Solve algebraically: $2 \log_3(x + 4) - \log_3(-x) = 2$
 - Jules invests \$5000 at an interest rate of 4% per annum, compounded semi-monthly. Write an expression to represent Jules' investment after t years.
 - Determine the half-life of an unknown substance if it takes 120 days for 10% of it to remain.
 - Show that $\left(\log \frac{a}{b}\right)\left(\log \frac{c}{d}\right) = \left(\log \frac{a}{c}\right)\left(\log \frac{b}{d}\right) + \left(\log \frac{a}{d}\right)\left(\log \frac{c}{b}\right)$ State any restrictions.
 - Prove the Power Law of Logarithms: $\log_b x^n = n \log_b x$ for $b > 0$ where $b \neq 1$.
 - Prove the change of base identity: $\log_b x = \frac{\log_c x}{\log_c b}$
- Challenge: For what value(s) of k is x a natural number: $\log_2(x + 1) = \log_4(kx)$