

**Simplify each expression. There should only be positive exponents in your answer.**

1.  $(256a^{20}b^{-4}c^0)^{\frac{1}{4}}$

2.  $\frac{10x^3y^{-3}z^{-5}}{2x^7y^{-5}}$

3.  $\frac{6x^{-7}y^{-1}}{18y^{-3}}$

**Evaluate each logarithm.**

4.  $\log_3 27$

5.  $\log_2 128$

6.  $\log_4 \left(\frac{1}{256}\right)$

**Write the following in logarithmic form.**

7.  $3^2 = 9$

8.  $7^3 = 343$

9.  $6^{-2} = \frac{1}{36}$

10. **A town's population increases at a rate of 3% each year. The town's population was 17,000 in the year 2005. What will the town's population be in the year 2025? Round to the nearest whole number.**

11. **You recently purchased a vehicle for \$12,500. The vehicle will depreciate at a rate of 10.5% per year. What will the value of the car be after 5 years? Round to the nearest cents.**

**Expand the following logarithms.**

12.  $\log 3x^4$

13.  $\log_5\left(\frac{y}{3}\right)$

14.  $\log_2\left(\frac{5x^2}{y^3}\right)$

**Condense the following logarithms.**

15.  $4\log x + \frac{1}{2}\log y$

16.  $2\log x - \log y$

17.  $3\log_7 x + \frac{1}{2}\log_7 y - 5\log_7 z$

**Solve the following logarithmic equations. Round to the nearest ten-thousandth.**

18.  $\log(3x+1) = 2$

19.  $2\log(x+1) = 5$

20.  $4\log_3(2x) = 30$