Name	Date	Period	

## Properties of Logarithmic Functions Homework

Problems 1 - 6, assuming x and y are positive, use properties of logarithms to write the expression as a sum or difference of logarithms.

1. log16 <i>x</i>	2. $\ln\left(\frac{3}{\gamma}\right)$
3. $\ln(e^3y^5)$	4. $\log(1000x^5)$
5. $\ln \sqrt{\frac{x^3}{y}}$	6. $\log_2(x^3y^2)$

Problems 7 – 12, assuming x, y, and z are positive, use properties of logarithms to write the expression as a single logarithm.

7. $\log_2 64 - \log_2 4$	8. $\ln(x+3) + 2\ln x$
9. $4\ln x + 7\ln y - 3\ln z$	$10.  \frac{1}{3} (\log x - 2\log y)$
11. $\frac{1}{3} [2\log(x+1) - \log x - \log(x-3)]$	12. $3[\ln x + \ln(x-2)] - 4\ln(x^2 - 4)$

Problems 13 - 16, use a calculator to evaluate to three decimal places.

13. log₄ 18	14. $\log_{\frac{1}{2}} 23$
15. log <sub>π</sub> 57	16. log <sub>0.4</sub> 16

Problems 17 - 22, find the exact value of the logarithm without using a calculator. If this is not possible, state the reason.

17. $\log_5 125 - \log_5 5$	18. $6 \ln e^5 + 4 \ln e^{-2}$
19. $\ln \frac{1}{\sqrt{e^3}}$	20. log₃(-27)
21. log₂ ∜32	22. $\log_3 \frac{1}{81}$

Problems 23 – 24, solve.

23. Mrs. Adams gave her students a quiz on logarithms. Every week for three months they took another quiz to see how much they remembered. The average scores of the students can be modeled by the human memory model s(t) = 87 - 12log(t + 1) for 0 ≤ t ≤ 12 where t is the time in weeks.
A. Find the average score on the original quiz.
B. What was the average score after 1 month (4 weeks)?
C. Find the average score at the end of the 12 weeks.
24. The Richter scale model for measuring magnitude R of an earthquake is modeled by the equation below, , where a is the amplitude in micrometers, T is the period in seconds, and B represents the dampening effect (weakening) of the wave due to the distance from the epicenter of the quake. R = log (a/T) + B
A. Find the magnitude R of a quake where a = 325, T = 4 and B = 3.25
B. Find the magnitude R of a quake where a = 230, T = 2 and B = 4.5