

**LOG PROPERTIES
EXPANDING AND CONDENSING**

NAME _____

Expand each of the following using the properties of logs.

1. $\log_3 6x$	2. $\log_6 x^5$	3. $\log_5 \frac{7}{3}$
4. $\log 5x^4 y^2$	5. $\log_3 \sqrt{x}$	6. $\ln \frac{2}{xy}$
7. $\log \frac{3y^4}{4x^3}$	8. $\log_3 \sqrt{5p}$	9. $\log_4 \frac{9(x+1)}{(x+2)}$

Condense the following using the properties of logs.

10. $\log_2 3 + \log_2 x$	11. $\log_5 8 - \log_5 3$	12. $5\log_7 r$
13. $2\ln 3 - \ln 5$	14. $\log 20 + 2\log y + \log z$	15. $\log_3 2 + \frac{1}{2}\log_3 y$
16. $\log_2 x + \log_2 y - \log_2 3$	17. $\log_4 (x+1) - \log_4 7 - 2\log_4 y$	18. $\ln 5 - \ln 3 - \ln x - \ln y$

ANSWERS:

1. $\log_3 6 + \log_3 x$

2. $5 \log_6 x$

3. $\log_5 7 - \log_5 3$

4. $\log 5 + 4 \log x + 2 \log y$

5. $\frac{1}{2} \log_3 x$

6. $\ln 2 - \ln x - \ln y$

7. $\log 3 + 4 \log y - \log 4 - \frac{1}{3} \log x$

8. $\frac{1}{2} \log_3 5 + \frac{1}{2} \log_3 p$

9. $\log_4 9 + \log_4(x+1) - \log_4(x+2)$

10. $\log_2 3x$

11. $\log_5 \frac{8}{3}$

12. $\log_7 r^5$

13. $\ln \frac{9}{5}$

14. $\log 20y^2z$

15. $\log_3 2\sqrt{y}$

16. $\log_2 \frac{xy}{3}$

17. $\log_4 \frac{(x+1)}{7y^2}$

18. $\ln \frac{5}{3xy}$