

Name _____

Date _____

1. Condense: $\ln 3 + \ln x - \ln y - 2 \ln z$	2. Condense: $\ln 5 + \frac{1}{2} \ln x + 2 \ln z$
3. Condense: $\log_5 9 + \frac{1}{2} \log_5 k + 2 \log_5 p$	4. Condense: $\ln 4 + 3 \ln x - 5 \ln y$
5. Condense: $\log_3 a - 2 \log_3 b - 3 \log_3 c$	6. Condense: $\log x + 2 \log y + 3 \log z - \log 5$
7. Condense: $2 \log_3 x + \log_3 y$	8. Condense: $\log 5 + \log x - \log y$
9. Condense: $3 \log_3 x - \log_3 7 - 4 \log_3 y$	10. Condense: $3 \log_5 3 + 2 \log_5 a - \log_5 b - 2 \log_5 c$



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11. Solve $3^{3x-5} + 2 = 83$	12. Solve $\log_4(5x-4) = 2$
13. Solve $2 \cdot 5^{x-2} + 11 = 261$	14. Solve $-15\log_2(3x+2) = -45$
15. Expand $\ln 2a^2b^3$	16. Expand $\log_2 \frac{3\sqrt{b}}{a^4c^2}$
17. Expand $\log \frac{3x^4}{y\sqrt[3]{z}}$	18. Expand $\log_2 w^3k^5\sqrt[4]{n}$

