

Name: _____

Date: _____

Expand each expression:

1) $\log_9 6x^3y^5z$

2) $\log_3 \frac{p^2q}{\sqrt[5]{3q-1}}$

3) $\log_{11} ab^{-4}c^{12}d^7$

4) $\log_4 10t^2uv^{-3}$

5) $\ln \frac{3a^4b^7c}{\sqrt[4]{b-9}}$

Condense each expression:

6) $3\log_5 x - \frac{1}{2}\log_5(6-x)$

7) $7\log_3 a + \log_3 b - 2\log_3(8c)$

8) $2\log_8(9x) - \log_8(2x-5)$

9) $2\log_6(5a) + \log_6 b + 7\log_6 c$

10) $\frac{1}{4}\ln(2a-b) - \frac{1}{5}\ln(3b+c)$