

Name : \_\_\_\_\_ Score : \_\_\_\_\_  
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### Properties of Logarithms

Expand each logarithm.

1)  $\log_4 (7 \cdot 9 \cdot 3)$

2)  $\log_{16} (p \cdot s \cdot d)^{\frac{1}{4}}$

3)  $\log_6 \left(\frac{m}{s}\right)$

4)  $\log_5 \left(\frac{s^6}{m}\right)$

5)  $\log_{12} (d \cdot m)^2$

6)  $\log_5 (s^5 \cdot b)$

Condense each expression to one logarithm.

7)  $3\log_{11} z - 3\log_{11} w$

8)  $6\log_8 9 + 3\log_8 7$

9)  $\log 4 + \log 3$

10)  $\log_6 7 - 2\log_6 9$

11)  $6\log_3 4 + 4\log_3 6 + \log_3 3$

12)  $2\log_{15} 6 + 6\log_{15} 9 + 4\log_{15} 2$

