

Algebra 2  
9-3 Properties of Logarithms Worksheet

1. Complete the following statements.

- a) The logarithm of the product of two numbers equals the \_\_\_\_\_ of the logarithms of the numbers.  
b) The logarithm of the \_\_\_\_\_ of two numbers equals the difference of the logarithms of the two numbers.

Write each expression in terms of  $\log M$  and  $\log N$ .

2.  $\log M^3$                                       3.  $\log MN^3$                                       4.  $\log \frac{M^7}{N^5}$   
5.  $\log \frac{1}{N^2}$                                       6.  $\log \sqrt[3]{M^2}$                                       7.  $\log M\sqrt{N}$

Write each expression as a single logarithm.

8.  $\log 2 - 3\log 7$                                       9.  $\log_3 16 + 2\log_3 5 - \log_3 4$                                       10.  $\log_4 7 + \log_4 5$   
11.  $7\log x + \frac{1}{4}\log x^8$                                       12.  $3\log_5 2 + \frac{1}{2}\log_5 49 - \log_5 14$                                       13.  $4\log_6 t - 8\log_6 u - 5\log_6 v$

Write the following as a single logarithm and give its numerical value.

14.  $\log_3 36 - \log_3 4$                                       15.  $\log 125 + \log 8$                                       16.  $\log_5 12 - \log_5 60$

Let  $x = \log_3 2$  and  $y = \log_3 10$ . Write each expression in terms of  $x$  and  $y$ .

17.  $\log_3 20$                                       18.  $\log_3 \frac{1}{8}$                                       19.  $\log_3 400$

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## Algebra 2CP

## 9-3 Properties of Logarithms Worksheet Answers

1. a) sum b) quotient

2.  $3\log M$

3.  $\log M + 3\log N$

4.  $7\log M - 5\log N$

5.  $-2\log N$

6.  $\frac{2}{3}\log M$

7.  $\log M + \frac{1}{2}\log N$

8.  $\log \frac{2}{343}$

9.  $\log_3 100$

10.  $\log_4 35$

11.  $\log x^9$

12.  $\log_5 4$

13.  $\log_6 \frac{t^4}{u^8 v^5}$

14. 2

15. 3

16. -1

17.  $x + y$

18.  $-3x$

19.  $2x + 2y$