

DIRECTIONS: Expand each logarithm in terms of $\log_2 M$ and $\log_2 N$.

1. $\log_2(MN)^4$

$4 \log_2 M + 4 \log_2 N$

3. $\log_2\left(\frac{M}{N}\right)^7$

$7 \log_2 M - 7 \log_2 N$

2. $\log_2 \sqrt[3]{M^2 N}$

$\frac{2}{3} \log_2 M + \frac{1}{3} \log_2 N$

4. $\log_2 \frac{1}{MN}$

$-\log_2 M - \log_2 N$

DIRECTIONS: Use the facts that $\log 9 \approx 0.95$ and $\log 2 \approx 0.30$ (accurate to two decimal places) to find the following.

5. $\log_2 \frac{9}{2}$

$.65$

6. $\log \sqrt{2}$

$.15$

7. $\log 36$

1.55

8. $\log \frac{20}{9}$

$.35$



9. $\log \frac{1}{2000}$

-3.30

10. $\log \sqrt[3]{\frac{2}{9}}$

$-.217$

DIRECTIONS: Condense these expressions into logarithms of single numbers or

expressions (and remember that $1 = \log$  )

11. $\log x - 4 \log y$

$\log \frac{x}{y^4}$

12. $\log_5 M - \frac{1}{4} \log_5 N$

$\log_5 \frac{M}{N^{1/4}}$ or $\log_5 \frac{M^4 \sqrt[4]{N^3}}{N}$

13. $\log_5 x - \log_5 y + 2$

$\log_5 \frac{25x}{y}$

14. $\frac{1 + \log_9 x}{2}$

$\log_9 3\sqrt{x}$

DIRECTIONS: Simplify.

15. $2 \log 5 + \log 4$

2

16. $2 \log_3 6 - \log_3 4$

2

17. $\log_4 40 - \log_4 5$

$\frac{3}{2}$

18. $\log_4 3 - \log_4 48$

-2