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

1. $\log_2(MN)^4$

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

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

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

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. $\log \frac{9}{2}$

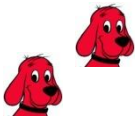
6. $\log \sqrt{2}$

7. $\log 36$

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

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

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

DIRECTIONS: Condense these expressions into logarithms of single numbers or expressions (and remember that $1 = \log$ )

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

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

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

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

DIRECTIONS: Simplify.

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

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

17. $\log_4 40 - \log_4 5$

18. $\log_4 3 - \log_4 48$