NAME _____ DATE _____

Practice 22

FOR USE WITH SECTION 4.3

Write each expression in terms of $\log_3 a$, $\log_3 b$, and $\log_3 c$.

1. $\log_3 a^5$

2. $\log_3 b^{1/2}$

3. $\log_3 ac^2$

4. $\log_3 \frac{b^{2/3}}{c^5}$

5. $\log_3 a^6 b^{1/4}$

6. $\log_3 \frac{ab^3}{c^4}$

7. $\log_3 \frac{a^7}{b^3 c}$

8. $\log_3 \frac{(ab)^{1/4}}{c}$

Write as a logarithm of a single number or expression.

9. $\frac{1}{2} \log_5 144$

10. $5 \log_b 2 + \log_b 3$

11. $\log_7 10 - 4 \log_7 5$

12. $3(\log_6 2 + \log_6 5)$

13. $\frac{3}{4} \log_3 16 + \log_3 6$

14. $2 \log_{11} x^3 - \log_{11} x^2$

15. $5 \log a + 2 \log b - 3 \log c$

16. $\frac{3}{2} \log_2 a^2 - \frac{5}{3} \log_2 b^3$

Let $x = \log_b 3$ and $y = \log_b 5$. Write each expression in terms of x and y.

17. $\log_b 15$

18. $\log_b \frac{1}{5}$

19. $\log_b \frac{5}{3}$

20. $\log_b 25$

21. $\log_b 81$

22. $\log_b 3\sqrt{5}$

23. $\log_b 5b^2$

24. $\log_b \frac{b}{3}$

25. The *magnitude* of a star is a measure of how bright the star appears in the night sky. Brighter stars have *smaller* magnitudes, and the magnitudes of the brightest stars are negative. Let B_0 = the brightness of a star of magnitude 0. Then the magnitude M of a star of brightness B is given by the formula

$$M = 2.5 \log \frac{B_0}{B}.$$

a. Suppose a star has a brightness $0.01B_0$. (That is, the star is 100 times dimmer than a star of magnitude 0.) What is its magnitude?

b. Two of the brightest stars, Canopus and Vega, have magnitudes of –0.72 and 0.04, respectively. How many times brighter is Canopus than Vega? (Hint: Let B_1 and B_2 be the brightnesses of Canopus and Vega. Subtract.)