F.S.T. *Name:* _____

Homework 6-5 *Block:* _____ *Date:* _____

In 1-6, use the properties of logarithms to rewrite to rewrite to expression in terms of $\log_{10} 3$ and $\log_{10} 4$. Then use $\log_{10} 3 \approx 0.477$ and $\log_{10} 4 \approx 0.602$ to approximate the expression.

1. $\log_{10} \frac{3}{4}$

2. $\log_{10} 12$

3. $\log_{10} 3^2$

4. $\log_{10} 16$

5. $\log_{10} 4^{-1}$

6. $\log_{10} \frac{1}{3}$

In 7-12, use the properties of logarithms to expand the expression.

7. $\log_6 3x$

8. $\log_2 \frac{x}{5}$

9. $\log_{10} xy^2$

10. $\log_4 \frac{xy}{3}$

11. $\log_3 x^{1/2} yz$

12. $\log_5 2\sqrt{x}$

In 13-18, condense the expression.

13. $\log_3 7 - \log_3 x$

14. $2\log_5 x + \log_5 3$

15. $\log_4 5 + \log_4 x + \log_4 y$

16. $\frac{1}{2}\log_{10} x - \log_{10} 4$

17. $\frac{2}{3}\log_2 x - 3\log_2 y$

18. $\log_3 4 + 2\log_3 x - \log_3 5$

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

19. $\log_b 15$

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

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

22. $\log_b 25$

In 23-28, condense the left side of the equation. Then solve for x.

23. $2\log_4 3 = \log_4 x$

24. $\log_{10} x + \log_{10} 3 = \log_{10} 12$

25. $\log_3 5 - \log_3 x = \log_3 2$

26. $\frac{1}{2}\log_3 16 = \log_3 x$

27. $\frac{1}{3}\log_{10} x = \log_{10} 3$

28. $3\log_5 2 + \log_5 x = \log_5 24$

29. The pH of a patients blood can b e calculated using the Henderson-Hasselbach Formula:
$pH = 6.1 + \log_{10} \frac{B}{C}$, where B is the concentration of bicarbonate and C is the concentration of carbonic acid. The normal pH is approximately 7.4.

a. Expand the right side of the formula.

b. A patient has a bicarbonate concentration of 24 and a carbonic concentration of 1.9. Find the pH of the patient's blood.

c. A patient with a normal blood pH has a bicarbonate concentration of 24. Find the concentration of carbonic acid. (Hint: First solve the equation in part a for $\log_{10} C$.)

In 30-31, rewrite as a linear function.

30. $y = 2.5(1.05)^x$

31. $y = 27.2(0.86)^x$

Write y as a function of x.

32. $\log y = -0.42 - 0.35x$

33. $\ln y = 2.5x + 3.2$

34. $\log y = 1.2\log x - 0.4$