

6.5 Properties of Logarithms

Name _____

Use the properties of logarithms to rewrite the expressions as logarithms of individual numbers or variables. Simplify where possible.

1. $\log_b(5x)$

2. $\log_b(4y)$

3. $\log_b(x^2)$

4. $\log_b(w^3)$

5. $\log_{10}(10w)$

6. $\log_5(25y)$

7. $\log_b\left(\frac{1}{2}\right)$

8. $\log_b\left(\frac{1}{x}\right)$

Answers: 1. $\log_b 5 + \log_b x$; 3. $2\log_b x$; 5. $1 + \log w$; 7. $-\log_b 2$

Use the properties of logarithms to rewrite the expressions as logarithms of individual numbers or variables. Simplify where possible.

9. $\log_b \left(\frac{1}{xy} \right)$

10. $\log_b \left(\frac{1}{3y} \right)$

11. $\log_b \left(\frac{x^2y}{5} \right)$

12. $\log_b \left(\frac{4y^3}{x} \right)$

13. $\log_2 (2\sqrt{5})$

14. $\log_3 (27\sqrt{2})$

15. $\log_b \left(\frac{\sqrt{5}}{b} \right)$

16. $\log_b \left(\frac{w}{b^5} \right)$

Answers: 9. $-\log_b x - \log_b y$; 11. $2\log_b x + \log_b y - \log_b 5$; 13. $1 + \frac{1}{2} \log_2 5$; 15. $\frac{1}{2} \log_b 5 - 1$

Use the properties of logarithms to rewrite the expressions as single logarithms. Simplify if possible.

17. $\log_b 8 + \log_b x$

18. $\log_b v + \log_b w$

19. $\frac{1}{2} \log_b (9)$

20. $\frac{1}{5} \log_b (32)$

21. $2\log_b x + 3\log_b (2y)$

22. $4\log_b (2v) + \log_b (5w)$

23. $2\log_b (3xy) - \log_b (x)$

24. $\log_b (3vw) - 2\log_b (w)$

25. $\log_b (2x + 3) - \log_b (5x - 1)$

26. $\log_b (y - 3) - \log_b (5y - 3)$

Answers: **17.** $\log_b (8x)$; **19.** $\log_b 3$; **21.** $\log_b (8x^2y^3)$; **23.** $\log_b (9xy^2)$; **25.** $\log_b \left(\frac{2x+3}{5x-1} \right)$