

Goal: Use the properties of log



Review: Properties of Exponents	Properties of Log
Product of Powers	Product Property
	Quotient Property
Quotient of Powers	
	Power Property

Examples:

Use the properties of logarithms to rewrite the expression in terms of log 2 and log 7. Then use $\log 2 \approx 0.301$ and $\log 7 \approx 0.845$ to approximate the expression.

1. $\log 4$

2. $\log 14$

3. $\log\left(\frac{7}{2}\right)$

4. $\log\left(\frac{2}{7}\right)$

5. $\log 7^{-3}$

6. $\log 49$

Expand the expression.

7. $\log_2(3x)$

8. $\log_3(9x)$

9. $\log\left(\frac{x}{5}\right)$

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

11. $\log_3 \sqrt{x} y z$

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

Condense the expression.

16. $\log_3 7 - \log_3 x$

17. $2 \log_5 x + \log_5 3$

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

19. $\frac{1}{2} \log x - \log 4$

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

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

CHANGE OF BASE FORMULALet u , b , and c be positive numbers with $b \neq 1$ and $c \neq 1$.

Then:

$$\log_c u = \frac{\log_b u}{\log_b c}$$

In particular, $\log_c u = \underline{\hspace{2cm}}$ and $\log_c u = \underline{\hspace{2cm}}$.Evaluate $\log_5 6$ using common and natural logarithms.**Solution**

Using common logarithms:

$$\log_5 6 = \frac{\log 6}{\log 5} = \frac{\log 6}{\log 5} \approx \frac{0.77815}{0.69897} \approx 1.113$$

Using natural logarithms:

$$\log_5 6 = \frac{\ln 6}{\ln 5} = \frac{\ln 6}{\ln 5} \approx \frac{1.79176}{1.60944} \approx 1.113$$

Use the change-of-base formula to rewrite the expression. Then use a calculator to evaluate the expression. Round your result to three decimal places.

25. $\log_2 5$

26. $\log_7 10$

27. $\log_3 17$

28. $\log_6 200$

29. $\log_5 \frac{1}{2}$

30. $\log_4 1235$

Algebra 2

7-4 Properties of Log

A#2

Practice

Assume that $\log 3 \approx 0.4771$, $\log 4 \approx 0.6021$, and $\log 5 \approx 0.6990$. Use the properties of logarithms to evaluate each expression. Do not use a calculator.

3. $\log 12$

4. $\log 16$

5. $\log \frac{3}{5}$

6. $\log 0.8$

7. $\log 75$

8. $\log \frac{16}{5}$

9. $\log_6 1 - \log 1$

10. $\log 60$

Write each logarithmic expression as a single logarithm.

11. $\log_5 4 + \log_5 3$

12. $\log_6 25 - \log_6 5$

13. $\log_2 4 + \log_2 2 - \log_2 8$

14. $5 \log_7 x - 2 \log_7 x$

15. $\log_4 60 - \log_4 4 + \log_4 x$

16. $\log 7 - \log 3 + \log 6$

26. $\log 2 + \log 4 - \log 7$

27. $\log_3 2x - 5 \log_3 y$

28. $\frac{1}{3}(\log_2 x - \log_2 y)$

29. $\frac{1}{2} \log x + \frac{1}{3} \log y - 2 \log z$

30. $3(4 \log t^2)$

31. $\log_5 y - 4(\log_5 r + 2 \log_5 t)$

Expand each logarithm.

32. $\log xyz$

33. $\log_2 \frac{x}{yz}$

34. $\log 6x^3y$

38. $\log_5 5x^{-5}$

39. $\log \frac{2x^2y}{3k^3}$

40. $\log_4 (3xyz)^2$