

Reteaching 8-4

OBJECTIVE: Rewriting logarithmic expressions

MATERIALS: None

- Logarithmic expressions can be rewritten using the **properties of logarithms.**

Product Property

$$\log_b MN = \log_b M + \log_b N$$

The log of a product is the sum of the logs of the factors.

Power Property

$$\log_b M^x = x \log_b M$$

The log of an expression raised to an exponent is the exponent times the log of the expression.

Quotient Property

$$\log_b \frac{M}{N} = \log_b M - \log_b N$$

The log of a quotient is the difference of the logs of the numerator and denominator.

Examples

Expand $\log_2 3x^4$.

$$\log_2 3x^4 = \log_2 3 + \log_2 x^4 = \log_2 3 + 4 \log_2 x$$

Write $\log_5 6 - \log_5 4$ as a single logarithm.

$$\log_5 6 - \log_5 4 = \log_5 \frac{6}{4} = \log_5 \frac{3}{2}$$

Exercises

Use properties of logarithms to expand the following expressions.

- | | |
|-----------------------|-------------------------|
| 1. $\log \frac{2}{3}$ | 2. $\log 6y$ |
| 3. $\log \frac{1}{5}$ | 4. $\log_3 x^3$ |
| 5. $\log_3 6xy$ | 6. $\log_6 36x^2$ |
| 7. $\log_5 xy$ | 8. $\log_3 \frac{x}{4}$ |
| 9. $\log_7 x^4$ | 10. $\log_3 x^2 y$ |
| 11. $\log_8 y^7$ | 12. $\log_5 x^4 y^3$ |

Use properties of logarithms to write each logarithmic expression as a single logarithm.

- | | |
|-----------------------------|-------------------------------|
| 13. $\log_3 13 + \log_3 3$ | 14. $2 \log x + \log 5$ |
| 15. $\log_4 2 - \log_4 6$ | 16. $3 \log_3 3 - \log_3 3$ |
| 17. $\log_5 8 + \log_5 x$ | 18. $\log 2 - 2 \log x$ |
| 19. $\log_2 x + \log_2 y$ | 20. $3 \log_7 x - 5 \log_7 y$ |
| 21. $4 \log x + 3 \log x$ | 22. $\log_5 x + 3 \log_5 y$ |
| 23. $3 \log_2 x - \log_2 y$ | 24. $\log_2 16 - \log_2 8$ |

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