LESSON MAKER PRO

Log Power Moves

Use log rules to rewrite and evaluate numerical expressions.

HIGH SCHOOL · MA.912.NSO.1.6

MA.912.NSO.1.6 "Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents."

NAME _____ DATE _____

THE BIG IDEA

For logarithms with the same base, turn multiplication inside into addition outside, division into subtraction, and powers into coefficients. Then rewrite each number as a power of the base to evaluate the expression.

WORKED EXAMPLE

Evaluate $\log_7(49/7)$.

1. Use the quotient rule: $\log_7(49) - \log_7(7)$.
2. Rewrite 49 as 7^2: 2 - 1.
3. Subtract: 1.

Answer: 1

PRACTICE 6 problems

1 Evaluate $\log_3(27)$.

ANSWER _____

2 Use logarithm properties to evaluate $\log_5(125 * 25)$.

ANSWER _____

3 Write as a single logarithm, then evaluate: $\log_3(81) - \log_3(3)$.

ANSWER _____

4 Evaluate $\log_6(36^3)$.

ANSWER _____

5 Use logarithm properties to evaluate $\log_5(625/5)$.

ANSWER _____

6 Write as a single logarithm, then evaluate: $4 \log_3(3) + \log_3(9)$.

ANSWER _____

APPLY IT Show your work

1 An esports platform gives a bonus rank modeled by log_3(243/3). What bonus rank does the platform assign?

WORK SPACE

ANSWER _____

2 A music producer uses a simplified sound-mix rating modeled by log_4(64 * 16). What rating is shown?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Without multiplying large numbers, evaluate log_3($9^4/3^3$). Explain your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY

Log Power Moves

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate log_3(27).	**3**
2	Use logarithm properties to evaluate log_5(125 * 25).	**5**
3	Write as a single logarithm, then evaluate: log_3(81) - log_3(3).	**3**
4	Evaluate log_6(36^3).	**6**
5	Use logarithm properties to evaluate log_5(625/5).	**3**
6	Write as a single logarithm, then evaluate: 4 log_3(3) + log_3(9).	**6**

PART 2 · APPLY IT

1. **4** Simplify the quotient to 81. Since $3^4 = 81$, log_3(81) = 4.
2. **5** Multiply inside the logarithm to get 1024. Since $4^5 = 1024$, the rating is 5.

CHALLENGE

5, because $9^4/3^3$ equals 3^5, so log_3(3^5) = 5.

Accept equivalent condensed or expanded logarithmic forms when a prompt asks for a form, as long as the base and value are preserved. For the challenge, require a valid use of exponent or logarithm properties.