LESSON MAKER PRO

Exponent Moves

Use exponent rules to simplify powers and solve real problems.

GRADE 8 · 8.AF.A.3

8.AF.A.3 "Develop and apply properties of integer exponents to generate equivalent numerical and algebraic expressions."

NAME _____ DATE _____

THE BIG IDEA

For the same nonzero base, multiply powers by adding exponents and divide powers by subtracting exponents. When you raise a power to a power, multiply the exponents. A negative exponent means take a reciprocal, and a zero exponent gives 1. In every problem, x is nonzero.

WORKED EXAMPLE

Simplify $13^9 / 13^7$.

1. The bases match, so subtract the exponents: 9 - 7 = 2.
2. Write the result as 13^2.
3. Calculate 13 × 13 = 169.

Answer: 169

PRACTICE 6 problems

1 Simplify $3^4 \times 3^{-6}$. Write your answer as a fraction.

ANSWER _____

2 Simplify $5^0 \times 5^{-3}$. Write your answer as a fraction.

ANSWER _____

3 Simplify $(x^{-4})^{-3}$. Use only positive exponents.

ANSWER _____

4 Simplify $(6x^{-3})(x^5)$. Use only positive exponents.

ANSWER _____

5 Simplify $8^{-4} / 8^{-6}$ to a whole number.

ANSWER _____

6 Simplify $(10x^4) / (5x^{-3})$. Use only positive exponents.

ANSWER _____

APPLY IT Show your work

1 A video has 4^5 views in the morning and 4^8 views that evening. How many times as many views does it have in the evening?

WORK SPACE

ANSWER _____

2 You have 10^4 credits in a game. A new character skin costs 10^{-1} of your credits. How many credits does the skin cost?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Simplify $(5x^{-3})^{-3} / (125^{-1}x^4)$. Use only positive exponents, and explain why the numerical factors cancel.

WORK SPACE AND ANSWER

ANSWER KEY

Exponent Moves

GRADE 8 · 8.AF.A.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Simplify $3^4 \times 3^{-6}$. Write your answer as a fraction.	**1/9**
2	Simplify $5^0 \times 5^{-3}$. Write your answer as a fraction.	**1/125**
3	Simplify $(x^{-4})^{-3}$. Use only positive exponents.	**x^{12}**
4	Simplify $(6x^{-3})(x^5)$. Use only positive exponents.	**$6x^2$**
5	Simplify $8^{-4} / 8^{-6}$ to a whole number.	**64**
6	Simplify $(10x^4) / (5x^{-3})$. Use only positive exponents.	**$2x^7$**

PART 2 · APPLY IT

1. **64 times as many views** Divide 4^8 by 4^5 to get 4^3, or 64.
2. **1,000 credits** Multiply 10^4 by 10^{-1} to get 10^3, or 1,000.

CHALLENGE

x^5. Both numerical factors equal 1/125, so they cancel.

Accept equivalent fractions or expressions that have been fully simplified. For the challenge, students should show that the numerator and denominator each have a numerical factor of 1/125.