LESSON MAKER PRO

Power Pattern Quest

Use exponent laws to rewrite and evaluate powers.

GRADE 7 · MA.7.NSO.1.1

MA.7.NSO.1.1 "Know and apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to whole-number exponents and rational number bases."

NAME _____ DATE _____

EXPONENT MOVES

When you multiply powers with the same base, add exponents. When you divide powers with the same nonzero base, subtract exponents, and when a power is raised to a power, multiply exponents. Any nonzero rational number raised to the 0 power equals 1.

WORKED EXAMPLE

Rewrite and evaluate: $(11/13)^4 / (11/13)^4$

1. The bases match, so subtract the exponents.
2. $(11/13)^{(4 - 4)} = (11/13)^0$.
3. A nonzero base raised to the 0 power equals 1.

Answer: 1

PRACTICE 6 problems

1 Rewrite as one power: $(1/2)^2 * (1/2)^8$

ANSWER _____

2 Rewrite as one power: $(3/8)^{10} / (3/8)^2$

ANSWER _____

3 Rewrite as one power: $((-2/3)^3)^2$

ANSWER _____

4 Evaluate: $(6/8)^0$

ANSWER _____

5 Rewrite as a power, then evaluate: $(2/3)^6 / (2/3)^6$

ANSWER _____

6 Evaluate: $(-1/2)^6$

ANSWER _____

APPLY IT Show your work

1 A music app uses two fade effects on a song. The first effect changes the volume by a factor of $(1/2)^2$, and the second changes it by a factor of $(1/2)^8$. What is the total volume factor as one power and as a fraction?

WORK SPACE

ANSWER _____

2 In a video game, a character's shrink spell has a size factor of $(2/3)^3$. The spell is applied to the whole result one more time, making the expression $((2/3)^3)^2$. Write the total size factor as one power.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student says that $((2/3)^8 / (2/3)^2)^3 = (2/3)^9$. Is the student correct? Explain your reasoning and give the correct equivalent expression.

WORK SPACE AND ANSWER

ANSWER KEY

Power Pattern Quest

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Rewrite as one power: $(1/2)^2 * (1/2)^8$	**$(1/2)^{10}$**
2	Rewrite as one power: $(3/8)^{10} / (3/8)^2$	**$(3/8)^8$**
3	Rewrite as one power: $((-2/3)^3)^2$	**$(-2/3)^6$**
4	Evaluate: $(6/8)^0$	**1**
5	Rewrite as a power, then evaluate: $(2/3)^6 / (2/3)^6$	**1**
6	Evaluate: $(-1/2)^6$	**1/64**

PART 2 · APPLY IT

1. **$(1/2)^{10} = 1/1024$** Multiply powers with the same base by adding the exponents, 2 + 8 = 10. Then evaluate $(1/2)^{10}$.
2. **$(2/3)^6$** For a power raised to a power, multiply the exponents. Since 3 * 2 = 6, the equivalent expression is $(2/3)^6$.

CHALLENGE

No. First subtract the exponents: 8 - 2 = 6. Then multiply the exponents: 6 * 3 = 18, so the correct expression is $(2/3)^{18}$.

Accept equivalent forms when they match the requested form or value. For negative rational bases, require parentheses so the exponent applies to the entire negative fraction.