LESSON MAKER PRO

Exponent Power Quest

Use integer exponents to simplify rational-number powers.

GRADE 8 · MA.8.NSO.1.3

MA.8.NSO.1.3 "Extend previous understanding of the Laws of Exponents to include integer exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions..."

NAME _____ DATE _____

THE BIG IDEA

For any nonzero rational number a, $a^{-n} = 1/a^n$ and $a^0 = 1$. When multiplying powers with the same base, add exponents, and when dividing, subtract exponents before evaluating.

WORKED EXAMPLE

Evaluate: $(7/11)^{-4} * (7/11)^5$

1. Add the exponents: -4 + 5 = 1.
2. $(7/11)^{-4} * (7/11)^5 = (7/11)^1$.
3. Evaluate the power: $(7/11)^1 = 7/11$.

Answer: 7/11

PRACTICE 6 problems

1 Evaluate: $(3/10)^{-2}$

ANSWER _____

2 Evaluate: $(-1/2)^3$

ANSWER _____

3 Write as one power, then evaluate: $(6/13)^2 * (6/13)^{-3}$

ANSWER _____

4 Evaluate: $(-2/9)^{-3}$

ANSWER _____

5 Evaluate: $(9/2)^0$

ANSWER _____

6 Simplify, then evaluate: $(2/3)^3 / (2/3)^{-2}$

ANSWER _____

APPLY IT Show your work

1 A streamer compresses a video before posting it. Each processing pass keeps 2/3 of the video's current file size. What fraction of the original file size remains after 3 passes?

WORK SPACE

ANSWER _____

2 A student shrinks a poster image so its area becomes $(2/3)^3$ of the original area. What factor must multiply the smaller area to restore the original area? Write and evaluate the factor as $(2/3)^{-3}$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Simplify and evaluate. Explain how you combined the exponents: $[(-2/3)^{-2} * (-2/3)^3] / (-2/3)^2$

WORK SPACE AND ANSWER

ANSWER KEY

Exponent Power Quest

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate: $(3/10)^{-2}$	**100/9**
2	Evaluate: $(-1/2)^{3}$	**-1/8**
3	Write as one power, then evaluate: $(6/13)^{2} * (6/13)^{-3}$	**13/6**
4	Evaluate: $(-2/9)^{-3}$	**-729/8**
5	Evaluate: $(9/2)^{0}$	**1**
6	Simplify, then evaluate: $(2/3)^{3} / (2/3)^{-2}$	**32/243**

PART 2 · APPLY IT

1. **8/27 of the original file size** Multiply the same factor three times: $(2/3)^{3} = 8/27$. The final file is 8/27 of the original size.
2. **27/8** A negative exponent means use the reciprocal: $(2/3)^{-3} = (3/2)^{3} = 27/8$.

CHALLENGE

-3/2

Accept equivalent reciprocal power forms in student work, such as $(10/3)^{2}$ for problem 1, but final evaluated fractions should be simplified. For the challenge, accept any correct explanation that adds exponents when multiplying and subtracts the divisor's exponent.