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

CHALLENGE

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

_____

_____

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. The exponents combine to -2 + 3 - 2 = -1, so the expression is (-2/3)^-1 = -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.