LESSON MAKER PRO

Radical Rewrite Lab

Move smoothly between roots and rational exponents.

HIGH SCHOOL · HSN-RN.A.2

CCSS.Math.Content.HSN-RN.A.2 "Rewrite expressions involving radicals and rational exponents using the properties of exponents."

NAME _____ DATE _____

EXPONENT AND ROOT CONNECTIONS

For $a > 0$, $a^{m/n}$ means the nth root of a^m. You can take the root first, then raise the result to the numerator power. A negative rational exponent means take the reciprocal: $a^{-m/n} = 1/(a^{m/n})$.

WORKED EXAMPLE

Rewrite and simplify $81^{3/4}$.

1. $81^{3/4} = (\text{4th root of } 81)^3$
2. $\text{4th root of } 81 = 3$
3. $3^3 = 27$

Answer: 27

PRACTICE 6 problems

1 Rewrite $25^{1/2}$ as a radical, then simplify.

ANSWER _____

2 Rewrite $32^{2/5}$ as a radical, then simplify.

ANSWER _____

3 Rewrite $49^{-1/2}$ without a negative exponent, then simplify.

ANSWER _____

4 For $x > 0$, rewrite $(x^6)^{1/2}$ as a single power of x.

ANSWER _____

5 For $y >= 0$, rewrite $y^{5/6}$ in radical form.

ANSWER _____

6 For $z > 0$, rewrite $1/(z^{7/8})$ using a negative rational exponent.

ANSWER _____

APPLY IT Show your work

1 A student council is planning a square esports area with an area of 196 square feet. The side length can be written as $196^{1/2}$ feet. Rewrite and simplify the expression to find the side length.

WORK SPACE

ANSWER _____

2 A phone backup app stores a video clip at $1/(128^{1/7})$ of its original size. Rewrite the expression using a negative rational exponent, then simplify the fraction of the original size.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Assume $a > 0$. Rewrite $(a^{7/6} * a^{-1/2})/a^{1/6}$ as a single power of a. Explain how the exponents combine.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Rewrite $25^{1/2}$ as a radical, then simplify.	**5**
2	Rewrite $32^{2/5}$ as a radical, then simplify.	**4**
3	Rewrite $49^{-1/2}$ without a negative exponent, then simplify.	**1/7**
4	For $x > 0$, rewrite $(x^6)^{1/2}$ as a single power of x.	**x^3**
5	For $y >= 0$, rewrite $y^{5/6}$ in radical form.	**6th root(y^5)**
6	For $z > 0$, rewrite $1/(z^{7/8})$ using a negative rational exponent.	**$z^{-7/8}$**

PART 2 · APPLY IT

1. **14 feet** $196^{1/2}$ is the square root of 196. Since $14^2 = 196$, the side length is 14 feet.
2. **1/2 of the original size** Rewrite the expression as $128^{-1/7}$. Since the 7th root of 128 is 2, the expression equals 1/2.

CHALLENGE

$a^{1/2}$; add the exponents in the numerator, then subtract 1/6 for division.

Accept equivalent radical forms, such as (6th root of y)^5 for 6th root(y^5). For variable expressions, accept equivalent forms only when the stated domain conditions are preserved.