LESSON MAKER PRO

Power Roots

Use roots and powers to simplify rational exponents.

HIGH SCHOOL · HSN-RN.A

CCSS.Math.Content.HSN-RN.A "Extend the properties of exponents to rational exponents."

NAME _____ DATE _____

RATIONAL EXPONENT RULES

For a positive base a, $a^{(m/n)}$ means take the nth root of a, then raise the result to the mth power. A negative rational exponent means take the reciprocal, so $a^{(-m/n)} = 1/a^{(m/n)}$.

WORKED EXAMPLE

Evaluate $625^{(3/4)}$.

1. Rewrite $625^{(3/4)}$ as $(625^{(1/4)})^3$.
2. Find the fourth root: $625^{(1/4)} = 5$.
3. Cube the result: $5^3 = 125$.

Answer: 125

PRACTICE 6 problems

1 Evaluate $81^{(1/2)}$.

ANSWER _____

2 Evaluate $27^{(2/3)}$.

ANSWER _____

3 Evaluate $64^{(-1/3)}$.

ANSWER _____

4 Evaluate $(1/49)^{(1/2)}$.

ANSWER _____

5 Simplify $x^{(1/2)}\, x^{(3/2)}$, where $x >= 0$.

ANSWER _____

6 Simplify $(32a^5)^{(1/5)}$.

ANSWER _____

APPLY IT Show your work

1 A student is designing a square cover image with an area of 196 square centimeters. Its side length is modeled by $s = A^{(1/2)}$. What is the side length?

WORK SPACE

ANSWER _____

2 In a sandbox video game, a cube-shaped build has a volume of 343 cubic blocks. Its edge length is modeled by $L = V^{(1/3)}$. What is the edge length?

WORK SPACE

ANSWER _____

CHALLENGE One step up

For $b > 0$, simplify $(b^{(3/4)})^{(-2/3)}$. Explain why your exponent is correct.

WORK SPACE AND ANSWER

Power Roots

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate $81^{(1/2)}$.	**9**
2	Evaluate $27^{(2/3)}$.	**9**
3	Evaluate $64^{(-1/3)}$.	**1/4**
4	Evaluate $(1/49)^{(1/2)}$.	**1/7**
5	Simplify $x^{(1/2)}\, x^{(3/2)}$, where x >= 0.	**x^2**
6	Simplify $(32a^5)^{(1/5)}$.	**2a**

PART 2 · APPLY IT

1. **14 centimeters** Substitute A = 196 into $s = A^{(1/2)}$. The square root of 196 is 14.
2. **7 blocks** Substitute V = 343 into $L = V^{(1/3)}$. The cube root of 343 is 7.

CHALLENGE

$1/b^{(1/2)}$.

Accept equivalent radical forms, such as 1/sqrt(b) for the challenge. For problem 5, x^2 is valid because the problem states x >= 0.