LESSON MAKER PRO

Roots in Disguise

Use roots to evaluate rational exponents.

HIGH SCHOOL · A3.N.5

A3.N.5 "Extend the meaning of exponents to include rational numbers."

NAME _____ DATE _____

THE BIG IDEA

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 exponent means take the reciprocal of the matching positive power.

WORKED EXAMPLE

Evaluate $32^{2/5}$.

1. Take the fifth root of 32: 2.
2. Square the result: $2^2 = 4$.

Answer: 4

PRACTICE 6 problems

1 Evaluate $81^{3/4}$.

ANSWER _____

2 Evaluate $125^{2/3}$.

ANSWER _____

3 Evaluate $16^{-3/4}$.

ANSWER _____

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

ANSWER _____

5 Evaluate $36^{1/2} + 49^{1/2}$.

ANSWER _____

6 Evaluate $27^{2/3} / 9^{1/2}$.

ANSWER _____

APPLY IT Show your work

1 A creator makes a square LED display with an area of 196 square inches. Its side length is $196^{1/2}$ inches. How many inches of LED strip are needed to frame all four sides?

WORK SPACE

ANSWER _____

2 In a video game, a cube-shaped room has a volume of 216 cubic units. The area of one face is $216^{2/3}$ square units. What is the total area of all six faces?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Find the positive number x if $x^{3/2} = 64$. Show how you know by evaluating $x^{3/2}$.

WORK SPACE AND ANSWER

Roots in Disguise

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate $81^{3/4}$.	**27**
2	Evaluate $125^{2/3}$.	**25**
3	Evaluate $16^{-3/4}$.	**1/8**
4	Evaluate $(1/64)^{1/3}$.	**1/4**
5	Evaluate $36^{1/2} + 49^{1/2}$.	**13**
6	Evaluate $27^{2/3} / 9^{1/2}$.	**3**

PART 2 · APPLY IT

1. **56 inches** The side length is the square root of 196, or 14 inches. Multiply by 4 to get 56 inches.
2. **216 square units** The cube root of 216 is 6, so each face has area $6^2 = 36$ square units. Six faces have a total area of 216 square units.

CHALLENGE

x = 16. The square root of 16 is 4, and $4^3 = 64$.

Accept equivalent exact forms. For the challenge, the student must verify that $16^{3/2} = 64$.