LESSON MAKER PRO

Roots in Action

Solve square and cube equations with root symbols.

GRADE 8 · 8.NOS.B.4.a

8.NOS.B.4.a "Use square and cube roots symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number."

NAME _____ DATE _____

THE ROOT RULE

If $x^2 = p$ and p is positive, write both solutions: $x = \sqrt{(p)}$ and $x = -\sqrt{(p)}$. If $x^3 = p$, write one solution: $x = \sqrt[3]{(p)}$. Simplify when the numerator and denominator are both perfect squares or both perfect cubes.

WORKED EXAMPLE

Solve $x^2 = 25/36$.

1. Write both possibilities: $x = \sqrt{(25/36)}$ or $x = -\sqrt{(25/36)}$.
2. Simplify the root: $\sqrt{(25/36)} = 5/6$.

Answer: x = 5/6 or x = -5/6

PRACTICE 6 problems

1 Solve $x^2 = 9/16$.

ANSWER _____

2 Solve $x^3 = 8/27$.

ANSWER _____

3 Solve $x^2 = 2/5$.

ANSWER _____

4 Solve $x^3 = 7/10$.

ANSWER _____

5 Solve $x^2 = 1/9$.

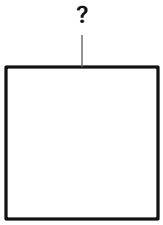
ANSWER _____

6 Solve $x^3 = 64/125$.

ANSWER _____

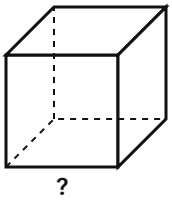
APPLY IT Show your work

1 A school club makes a square dance mat with an area of 9/4 square feet. Let x be its side length in feet. Write an equation, then use a root symbol to find x.



ANSWER _____

2 A student builds a cube-shaped storage box for art supplies. Its inside volume is 1/8 cubic foot. Let x be the inside edge length in feet. Write an equation, then use a root symbol to find x.



ANSWER _____

CHALLENGE One step up

Solve $x^2 = 12/25$ and $x^3 = 12/25$ using root symbols. Explain why the equations have different numbers of real solutions.

WORK SPACE AND ANSWER

ANSWER KEY # Roots in Action

GRADE 8 · 8.NOS.B.4.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve $x^2 = 9/16$.	**$x = \sqrt{(9/16)}$ or $x = -\sqrt{(9/16)}$; $x = 3/4$ or $x = -3/4$**
2	Solve $x^3 = 8/27$.	**$x = \sqrt[3]{(8/27)} = 2/3$**
3	Solve $x^2 = 2/5$.	**$x = \sqrt{(2/5)}$ or $x = -\sqrt{(2/5)}$**
4	Solve $x^3 = 7/10$.	**$x = \sqrt[3]{(7/10)}$**
5	Solve $x^2 = 1/9$.	**$x = \sqrt{(1/9)}$ or $x = -\sqrt{(1/9)}$; $x = 1/3$ or $x = -1/3$**
6	Solve $x^3 = 64/125$.	**$x = \sqrt[3]{(64/125)} = 4/5$**

PART 2 · APPLY IT

1. **$x^2 = 9/4$; $x = \sqrt{(9/4)} = 3/2$ feet** A square's area is its side length squared. Use the positive root because a length cannot be negative.
2. **$x^3 = 1/8$; $x = \sqrt[3]{(1/8)} = 1/2$ foot** A cube's volume is its edge length cubed. The cube root of 1/8 is 1/2.

CHALLENGE

For $x^2 = 12/25$, $x = \sqrt{(12/25)}$ or $x = -\sqrt{(12/25)}$. For $x^3 = 12/25$, $x = \sqrt[3]{(12/25)}$. Opposite numbers have the same square, but only one real number has a given cube.

Accept $\pm\sqrt{(p)}$ in place of two separately written square-root solutions. For the word problems, accept equivalent units such as 1.5 feet and 0.5 foot when the root-symbol form is also shown.