LESSON MAKER PRO

Roots in Action

Solve equations with square roots and cube roots.

GRADE 8 · MT.8.EE.2

MT.8.EE.2 "Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number and evaluate square roots of small perfect squares and cube roots of small perfect cubes."

NAME _____ DATE _____

THE ROOT RULE

If $x^2 = p$ and p is positive, the solutions are $x = \pm\sqrt{p}$ because a positive number and its opposite have the same square. If $x^3 = p$, the one solution is $x = \sqrt[3]{p}$.

WORKED EXAMPLE

Solve $x^2 = 49$.

1. Write both possible values: $x = \pm\sqrt{49}$.
2. Evaluate the root: $\sqrt{49} = 7$.
3. So $x = 7$ or $x = -7$.

Answer: x = 7 or x = -7

PRACTICE 6 problems

1 Evaluate $\sqrt{64}$.

ANSWER _____

2 Evaluate $\sqrt[3]{216}$.

ANSWER _____

3 Solve $x^2 = 81$. Use a root symbol in your answer.

ANSWER _____

4 Solve $x^3 = 27$. Use a root symbol in your answer.

ANSWER _____

5 Solve $x^2 = 9/16$. Use a root symbol in your answer.

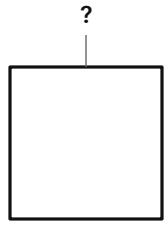
ANSWER _____

6 Solve $x^3 = 8/125$. Use a root symbol in your answer.

ANSWER _____

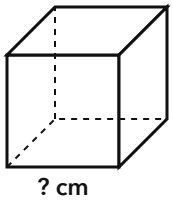
APPLY IT Show your work

1 A student makes a square sticker for a club logo. Its area is 144 cm^2. Write a root expression and find the length of one side.



ANSWER _____

2 A game club makes a cube-shaped foam prop with a volume of 512 cm^3. Write a root expression and find the length of one edge.



ANSWER _____

CHALLENGE One step up

Solve both equations: $x^2 = 1/64$ and $x^3 = 1/64$. Explain why one equation has two solutions and the other has one.

WORK SPACE AND ANSWER

ANSWER KEY # Roots in Action

GRADE 8 · MT.8.EE.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate $\sqrt{64}$.	**8**
2	Evaluate $\sqrt[3]{216}$.	**6**
3	Solve $x^2 = 81$. Use a root symbol in your answer.	**$x = \pm\sqrt{81} = \pm 9$**
4	Solve $x^3 = 27$. Use a root symbol in your answer.	**$x = \sqrt[3]{27} = 3$**
5	Solve $x^2 = 9/16$. Use a root symbol in your answer.	**$x = \pm\sqrt{(9/16)} = \pm 3/4$**
6	Solve $x^3 = 8/125$. Use a root symbol in your answer.	**$x = \sqrt[3]{(8/125)} = 2/5$**

PART 2 · APPLY IT

1. **$\sqrt{144} = 12$; the side length is 12 cm.** The area of a square is its side length squared. Use the positive square root because a length cannot be negative.
2. **$\sqrt[3]{512} = 8$; the edge length is 8 cm long.** The volume of a cube is its edge length cubed. Since $8^3 = 512$, each edge is 8 cm long.

CHALLENGE

For $x^2 = 1/64$, $x = \pm\sqrt{(1/64)} = \pm 1/8$. For $x^3 = 1/64$, $x = \sqrt[3]{(1/64)} = 1/4$. Both 1/8 and -1/8 have the same square, but only 1/4 has a cube of 1/64.

For squared equations, require both positive and negative solutions. Accept equivalent root notation when the values and signs are correct.