

Roots in Action

Solve square and cube root equations with confidence.

GRADE 8 • NY-8.EE.2

NY-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. Know square roots of perfect squares up to 225 and cube roots of perfect cubes up to 125..."

NAME _____

DATE _____

ROOT RULES

For $x^2 = p$, write $x = \pm\sqrt{p}$ because both a positive and a negative number can have the same square. For $x^3 = p$, write $x = \sqrt[3]{p}$ because a cube has one real solution. When a positive integer is not a perfect square, its square root is irrational.

WORKED EXAMPLE

Solve $x^2 = 144$.

1. Write $x = \pm\sqrt{144}$.
2. Since $144 = 12 \times 12$, $\sqrt{144} = 12$.
3. So $x = 12$ or $x = -12$.

Answer: $x = \pm 12$

PRACTICE 6 problems

1 Solve $x^2 = 81$.

ANSWER _____

2 Solve $x^3 = 64$.

ANSWER _____

3 Solve $x^2 = 49/64$.

ANSWER _____

4 Solve $x^3 = 1/8$.

ANSWER _____

5 Is $\sqrt{50}$ rational or irrational? Explain how you know.

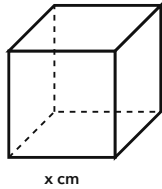
ANSWER _____

6 Solve $x^2 = 121$. First use a square root symbol, then simplify.

ANSWER _____

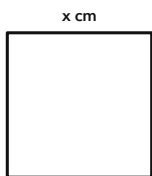
APPLY IT Show your work

- 1** A game-design club makes a cube-shaped prize display with a volume of 125 cubic centimeters. The edge length is x centimeters. Write and solve an equation to find x .



ANSWER _____

- 2** A student is making a square profile sign with an area of 196 square centimeters. Each side length is x centimeters. Write and solve an equation to find x .



ANSWER _____

CHALLENGE One step up

For $x^2 = 2/9$, write both solutions in simplest radical form. Then tell whether the solutions are rational or irrational and explain.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Solve $x^2 = 81$.	$x = \pm 9$
2	Solve $x^3 = 64$.	$x = 4$
3	Solve $x^2 = 49/64$.	$x = \pm 7/8$
4	Solve $x^3 = 1/8$.	$x = 1/2$
5	Is $\sqrt{50}$ rational or irrational? Explain how you know.	Irrational, because 50 is not a perfect square.
6	Solve $x^2 = 121$. First use a square root symbol, then simplify.	$x = \pm\sqrt{121} = \pm 11$

PART 2 • APPLY IT

- $x^3 = 125$; $x = \sqrt[3]{125} = 5$ cm Use volume = x^3 for a cube. Take the cube root of 125 to get an edge length of 5 cm.
- $x^2 = 196$; $x = \sqrt{196} = 14$ cm Use area = x^2 for a square. The positive square root of 196 is 14 because a length cannot be negative.

CHALLENGE

$x = \pm\sqrt{2/3}$; both solutions are irrational because $\sqrt{2}$ is irrational.

Accept $x = 9$ or $x = -9$ in place of ± 9 . For square equations in real-number contexts involving lengths, accept only the positive solution after students identify that a measurement cannot be negative.