LESSON MAKER PRO

Root Detectives

Find solutions with square and cube roots.

GRADE 8 · 8.NOS.B.4

8.NOS.B.4 "Use square and cube roots to represent solutions to equations and describe numbers. 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 BIG IDEA

For positive p, $x^2 = p$ has two solutions, $x = \pm\sqrt{p}$, because a number and its opposite have the same square. The equation $x^3 = p$ has one solution, $x = \sqrt[3]{p}$. To evaluate a square root, find a number that multiplies by itself to make p. For a cube root, find a number that multiplies by itself three times to make p.

WORKED EXAMPLE

Solve $x^2 = 36$. Use a square-root symbol in your solution.

1. Write $x = \pm\sqrt{36}$.
2. Since $6 \times 6 = 36$, $\sqrt{36} = 6$.
3. Include both signs because 6 and -6 have the same square.

Answer: $x = \pm 6$

PRACTICE 6 problems

1 Evaluate $\sqrt{81}$.

ANSWER _____

2 Evaluate $\sqrt[3]{64}$.

ANSWER _____

3 Solve $x^2 = 25$. Write the square-root expression and its value.

ANSWER _____

4 Solve $x^3 = 125$. Write the cube-root expression and its value.

ANSWER _____

5 Solve $x^2 = 4/9$. Write the square-root expression and its value.

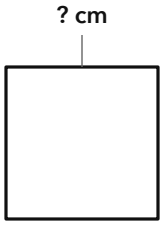
ANSWER _____

6 Solve $x^3 = 27/8$. Write the cube-root expression and its value.

ANSWER _____

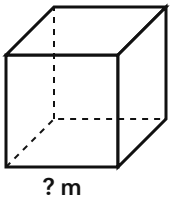
APPLY IT Show your work

1 A square sticker for a laptop has an area of 100 cm². What is the length of one side? Write a square-root expression and its value.



ANSWER _____

2 A cube-shaped booth at a gaming event has a volume of 8 m³. What is the length of one edge? Write a cube-root expression and its value.



ANSWER _____

CHALLENGE One step up

Solve $x^2 = 1/4$ and $x^3 = 1/8$. Explain in one sentence why the equations have different numbers of real solutions.

WORK SPACE AND ANSWER

ANSWER KEY # Root Detectives

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate $\sqrt{81}$.	**9**
2	Evaluate $\sqrt[3]{64}$.	**4**
3	Solve $x^2 = 25$. Write the square-root expression and its value.	**$x = \pm\sqrt{25} = \pm 5$**
4	Solve $x^3 = 125$. Write the cube-root expression and its value.	**$x = \sqrt[3]{125} = 5$**
5	Solve $x^2 = 4/9$. Write the square-root expression and its value.	**$x = \pm\sqrt{(4/9)} = \pm 2/3$**
6	Solve $x^3 = 27/8$. Write the cube-root expression and its value.	**$x = \sqrt[3]{(27/8)} = 3/2$**

PART 2 · APPLY IT

1. **$\sqrt{(100\ \text{cm}^2)} = 10$ cm** A square's area is its side length squared. Use the positive square root because a length cannot be negative.
2. **$\sqrt[3]{(8\ \text{m}^3)} = 2$ m** A cube's volume is its edge length cubed. The cube root of 8 m³ is 2 m.

CHALLENGE

$x^2 = 1/4$: $x = \pm\sqrt{(1/4)} = \pm 1/2$; $x^3 = 1/8$: $x = \sqrt[3]{(1/8)} = 1/2$. Both 1/2 and -1/2 square to 1/4, but only 1/2 cubes to 1/8.

Accept the two square-root solutions written separately instead of with ±. For the context problems, accept equivalent root expressions that include the correct units.