LESSON MAKER PRO

Root Power

Solve square and cube root equations.

GRADE 8 · 8.NR.2.2

8.NR.2.2 "Use square root and cube root symbols to represent solutions to equations. Recognize that $x^2 = p$ (where p is a positive rational number and $|x| \leq 25$) has two solutions and $x^3 = p$ (where p is a negative or positive rational number and $|x| \leq$..."

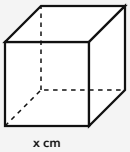
NAME _____ DATE _____

ROOTS AND SOLUTIONS

To solve $x^2=p$ when p is positive, use both numbers whose square is p, a positive and a negative number. To solve $x^3=p$, use the one number whose cube is p. A square root asks for a number multiplied by itself, and a cube root asks for a number multiplied by itself three times.

WORKED EXAMPLE

The cube shown has a volume of 216 cm^3. Its edge length is x cm. Find x.

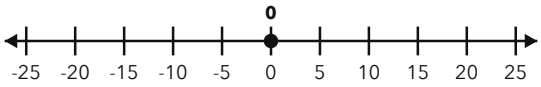


1. A cube's volume is its edge length cubed, so $x^3=216$.
2. Take the cube root of both sides: $x=\sqrt[3]{216}$.
3. Since $6 \times 6 \times 6=216$, $x=6$.

Answer: x=6 cm

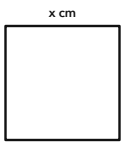
PRACTICE 6 problems

1 Use the number line. Which two labeled tick values are 20 units from 0? They are the solutions of $x^2=400$.



ANSWER _____

2 The square shown has an area of 169 cm^2. If $x^2=169$, what are both values of x?



ANSWER _____

3 Evaluate $\sqrt{625}$.

ANSWER _____

4 Use a cube root symbol to solve $x^3=-512$.

ANSWER _____

5 Evaluate $\sqrt[3]{1000}$.

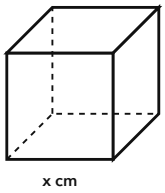
ANSWER _____

6 Use a square root symbol to solve $x^2=9/16$.

ANSWER _____

APPLY IT Show your work

1 A maker is 3-D printing the cube shown for a gaming display. The cube's volume is 343 cm^3, and each edge is x cm long. Write an equation and find the edge length.



ANSWER _____

2 A skateboard app measures signed distance x, in meters, from the center of a ramp. A trick marker follows $x^2=225$. What are the two possible signed locations of the marker?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student says that every root equation has two solutions. Is the student correct? Solve $x^3=-729$ and explain your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY

Root Power

GRADE 8 · 8.NR.2.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the number line. Which two labeled tick values are 20 units from 0? They are the solutions of $x^2=400$.	**x=-20 and x=20**
2	The square shown has an area of 169 cm². If $x^2=169$, what are both values of x?	**x=-13 and x=13**
3	Evaluate $\sqrt{625}$.	**25**
4	Use a cube root symbol to solve $x^3=-512$.	**$x=\sqrt[3]{(-512)}=-8$**
5	Evaluate $\sqrt[3]{1000}$.	**10**
6	Use a square root symbol to solve $x^2=9/16$.	**x=3/4 and x=-3/4**

PART 2 · APPLY IT

1. **$x^3=343$; x=7 cm** Set the cube volume equal to x^3. Since 7 × 7 × 7=343, the edge length is 7 cm.
2. **x=-15 m and x=15 m** Both 15 and -15 square to 225. The negative location is on one side of the ramp center, and the positive location is on the other side.

CHALLENGE

No. x=-9 is the one solution because (-9) × (-9) × (-9)=-729.

Accept square-equation solutions in either order. For square equations, require both the positive and negative solutions, while cube equations have one real solution.