LESSON MAKER PRO

Roots in Action

Find real solutions for square and cube equations.

GRADE 8 · MA.8.AR.2.3

MA.8.AR.2.3 "Given an equation in the form of $x^2=p$ and $x^3=q$, where p is a whole number and q is an integer, determine the real solutions."

NAME _____ DATE _____

SQUARE AND CUBE ROOTS

For $x^2 = p$, a positive whole number p has two real solutions, one positive and one negative. If p is 0, x = 0 is the only real solution. For $x^3 = q$, there is exactly one real solution, even when q is negative.

WORKED EXAMPLE

Solve $x^3 = -125$.

1. Start with $x^3 = -125$.
2. Take the cube root of both sides.
3. $x = -5$.

Answer: x = -5

PRACTICE 6 problems

1 Solve $x^2 = 36$.

ANSWER _____

2 Solve $x^3 = 64$.

ANSWER _____

3 Solve $x^2 = 0$.

ANSWER _____

4 Solve $x^3 = -27$.

ANSWER _____

5 Solve $x^2 = 81$.

ANSWER _____

6 Solve $x^3 = 8$.

ANSWER _____

APPLY IT Show your work

1 In a coding club's game, x represents an integer change to a character's power level. The game rule is $x^3 = -216$. What is the real value of x?

WORK SPACE

ANSWER _____

2 A square photo backdrop has an area of 196 square inches. Its side length is x inches. What is x?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A number x makes one of these equations true: $x^2 = 144$ or $x^3 = -512$. List every possible real value of x.

WORK SPACE AND ANSWER

ANSWER KEY

Roots in Action

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve $x^2 = 36$.	**x = -6 or x = 6**
2	Solve $x^3 = 64$.	**x=4**
3	Solve $x^2 = 0$.	**x=0**
4	Solve $x^3 = -27$.	**x = -3**
5	Solve $x^2 = 81$.	**x = -9 or x = 9**
6	Solve $x^3 = 8$.	**x=2**

PART 2 · APPLY IT

1. **x = -6** Take the cube root of both sides. The cube root of -216 is -6.
2. **x = 14** Write $x^2 = 196$ and find the square roots, -14 and 14. Because x is a side length, accept only the positive value, 14.

CHALLENGE

x = -12, x = -8, or x = 12

Accept solutions in any order. For positive square equations, students must include both positive and negative roots, except when a context such as a length limits the answer to a positive value.