LESSON MAKER PRO

Root Quest

Find exact lengths and solutions.

GRADE 8 · 8.AF.A.4

8.AF.A.4 "Use square root and cube root symbols to represent solutions to equations. a. Evaluate square roots of perfect squares (less than or equal to 225) and cube roots of perfect cubes (less than or equal to 1000). b..."

NAME _____ DATE _____

ROOTS UNDO POWERS

A square root undoes squaring, and a cube root undoes cubing. The symbol √ gives the nonnegative square root, but an equation with x^2 can have both a positive and a negative solution. The square root of a number that is not a perfect square is irrational.

WORKED EXAMPLE

Solve $x^2 = 64$.

1. Take square roots: $x = \pm\sqrt{64}$.
2. Since $8 \times 8 = 64$, $\sqrt{64} = 8$.

Answer: x = 8 or x = -8

PRACTICE 6 problems

1 Evaluate $\sqrt{144}$.

ANSWER _____

2 Evaluate $\sqrt{225}$.

ANSWER _____

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

ANSWER _____

4 Solve $x^3 = -125$. Use a cube root symbol, then evaluate.

ANSWER _____

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5 Solve $x^2 = 121$. Use a square root symbol, then give both values.

ANSWER _____

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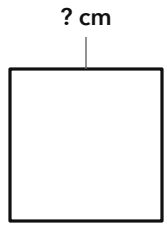
6 Is $\sqrt{20}$ rational or irrational? Explain using perfect squares.

ANSWER _____

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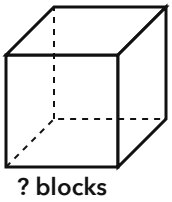
APPLY IT Show your work

1 A student designs a square sticker with an area of 169 cm^2. What is the length of one side?



ANSWER _____

2 In a building game, a solid cube is made of 729 unit blocks. How many blocks long is each edge?



ANSWER _____

CHALLENGE One step up

A student says $x^2 = 75$ has no solutions because 75 is not a perfect square. Write both exact solutions using square root symbols. Explain why the student's claim is wrong and why $\sqrt{75}$ is irrational.

WORK SPACE AND ANSWER

ANSWER KEY # Root Quest

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate $\sqrt{144}$.	**12**
2	Evaluate $\sqrt{225}$.	**15**
3	Evaluate $\sqrt[3]{216}$.	**6**
4	Solve $x^3 = -125$. Use a cube root symbol, then evaluate.	**$x = \sqrt[3]{(-125)} = -5$**
5	Solve $x^2 = 121$. Use a square root symbol, then give both values.	**$x = \pm\sqrt{121} = \pm 11$**
6	Is $\sqrt{20}$ rational or irrational? Explain using perfect squares.	**Irrational. Since 20 is not a perfect square, $\sqrt{20}$ is irrational.**

PART 2 · APPLY IT

1. **13 cm** A side length is $\sqrt{169}$ cm. Since 13 × 13 = 169, the side is 13 cm.
2. **9 blocks** The number of blocks along an edge is $\sqrt[3]{729}$. Since 9 × 9 × 9 = 729, each edge is 9 blocks long.

CHALLENGE

$x = \sqrt{75}$ or $x = -\sqrt{75}$. Both values square to 75, so the equation has two solutions. Since 75 is not a perfect square, $\sqrt{75}$ is irrational.

For square equations, require both the positive and negative solutions. Accept equivalent wording that identifies a non-perfect square as the reason its square root is irrational.