

Key Concept

Solving Equations Containing Cubes To solve an equation of the form $x^3 = a$, take the cube root of each side of the equation.

Given $x^3 = 125$

Write the equation.

Take the cube root of each side.

Simplify the cube root.

Write the solution.

$$x^3 = 125$$

$$\sqrt[3]{x^3} = \sqrt[3]{125}$$

$$x = 5$$

The solution is 5.

Check

$$x^3 = 5 \cdot 5 \cdot 5$$

$$= 125$$

Part 1

Example Solving Equations Using Cube Roots

Solve each equation.

a. $x^3 = 8$

b. $x^3 = -27$

c. $x^3 = 64$

d. $x^3 = -125$

Solution

To solve each equation, take the cube root of each side of the equation.

a. $x^3 = 8$

$$\sqrt[3]{x^3} = \sqrt[3]{8}$$

$$x = \sqrt[3]{8}$$

$$x = 2$$

The solution

$$x = 2$$

b. $x^3 = -27$

$$\sqrt[3]{x^3} = \sqrt[3]{-27}$$

$$x = \sqrt[3]{-27}$$

$$x = -3$$

The solution

$$x = -3$$

c. $x^3 = 64$

$$\sqrt[3]{x^3} = \sqrt[3]{64}$$

$$x = \sqrt[3]{64}$$

$$x = 4$$

The solution

$$x = 4$$

d. $x^3 = -125$

$$\sqrt[3]{x^3} = \sqrt[3]{-125}$$

$$x = \sqrt[3]{-125}$$

$$x = -5$$

The solution

$$x = -5$$

Part 2

Example Solving Equations Using Cube Roots of Fractions

Solve $x^3 = \frac{8}{125}$

Solution

Think

Write the equation.

Take the cube root of each side.

Simplify the cube root.

Write the solution.

Check the solution.

Write

$$x^3 = \frac{8}{125}$$

$$x = \sqrt[3]{\frac{8}{125}}$$

$$x = \frac{2}{5}$$

The solution is $\frac{2}{5}$.

$$\left(\frac{2}{5}\right)^3 = \frac{2}{5} \cdot \frac{2}{5} \cdot \frac{2}{5} = \frac{8}{125}$$

Part 3

Example Using Cube Roots to Solve Volume Problems

An aquarium in the shape of a cube has a volume of 1,250 cubic inches.

- What is the exact length of one side of the aquarium?
- If your answer is not a perfect cube, approximate your answer to the nearest tenth of an inch.

Solution

- You can use the formula for the volume of a cube to find the length of one side.

Use the formula for the volume of a cube.

$$V = s^3$$

Substitute 1,250 for the volume.

$$1,250 = s^3$$

Take the cube root of each side.

$$\sqrt[3]{1,250} = s$$

The exact length of one side of the aquarium is $\sqrt[3]{1,250}$ inches.

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Math In Focus Answer Key Grade 5

Betty Jane Wagner



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