Edge Lengths and Volumes

Let's explore the relationship between volume and edge lengths of cubes.

14.1 Ordering Squares and Cubes

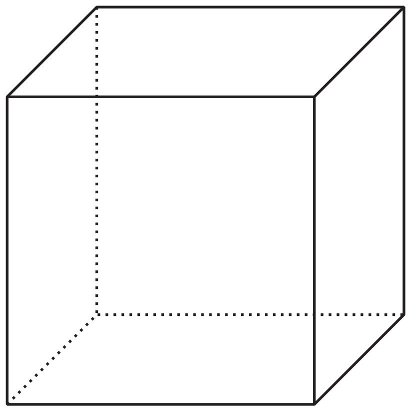
Let a, b, c, d, e, and f be positive numbers.

Given these equations, arrange a, b, c, d, e, and f from least to greatest. Explain your reasoning.

- $a^2 = 9$
- $b^3 = 8$
- $c^2 = 10$
- $d^3 = 9$
- $e^2 = 8$
- $f^3 = 7$

14.2 Name That Edge Length!

Fill in the missing values using the information provided:



sides	volume	volume equation
	27 in^3	
$\sqrt[3]{5}$ in		
		$(\sqrt[3]{16})^3 = 16$

Are you ready for more?

A cube has a volume of 8 cubic centimeters. A square has the same value for its area as the value for the surface area of the cube. How long is each side of the square?

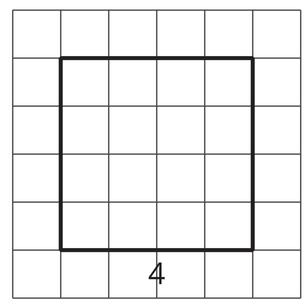
14.3 Card Sort: Rooted in the Number Line

Your teacher will give you a set of cards. Each card has a number line with a plotted point, an equation, or a square or **cube root** value.

For each card with a letter and square or cube root value, match it with the location on a number line where the value exists, and the equation that the value makes true. Record your matches and be prepared to explain your reasoning.

Lesson 14 Summary

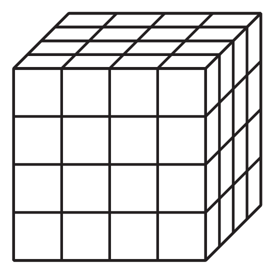
For a square, its side length is the square root of its area. For example, this square has an area of 16 square units and a side length of 4 units.



Both of these equations are true:

$$4^2 = 16 \qquad \sqrt{16} = 4$$

For a cube, the edge length is the **cube root** of its volume. For example, this cube has a volume of 64 cubic units and an edge length of 4 units:



Both of these equations are true:

$$4^3 = 64 \qquad \sqrt[3]{64} = 4$$

$\sqrt[3]{64}$ is pronounced “the cube root of 64.” Here are some other values of cube roots:

$$\sqrt[3]{8} = 2 \text{ because } 2^3 = 8$$

$$\sqrt[3]{27} = 3 \text{ because } 3^3 = 27$$

$$\sqrt[3]{125} = 5 \text{ because } 5^3 = 125$$