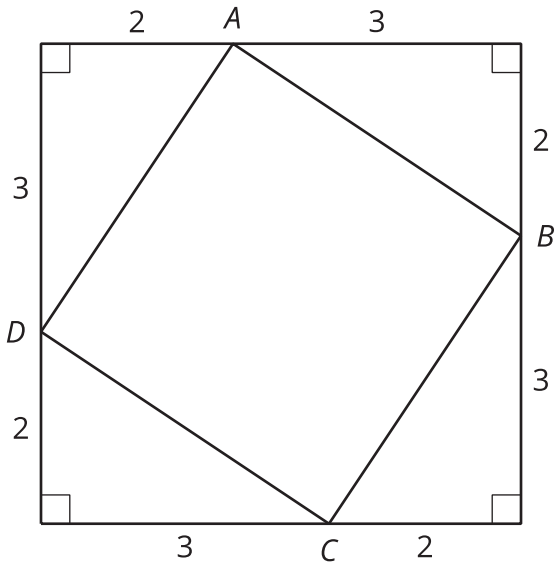
Unit 4, Lesson 2

Square Roots and Cube Roots

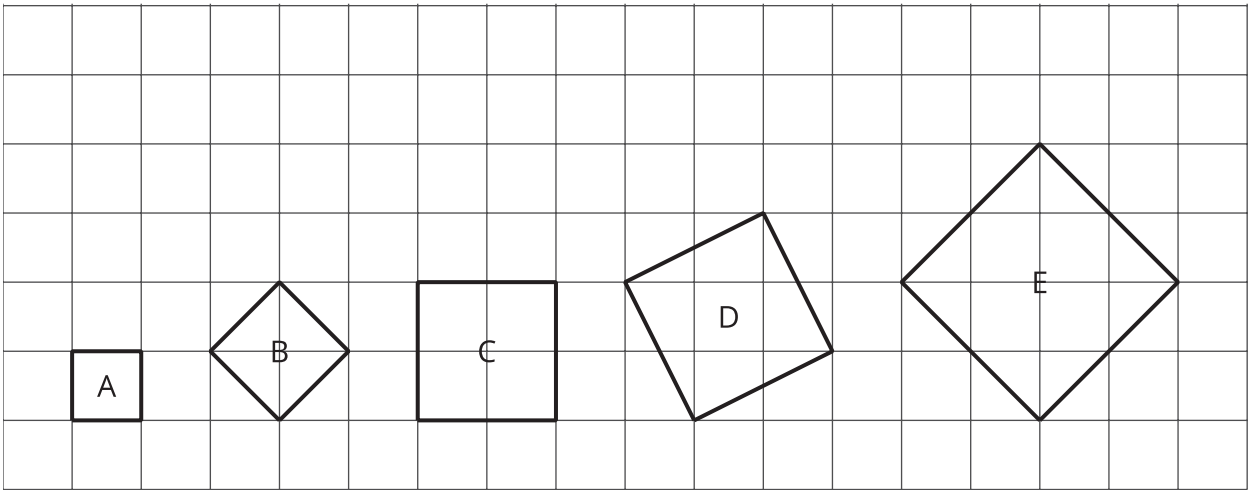
Let's think about square and cube roots.

2.1 It's a Square

Find the area of square $ABCD$.



2.2 Squares and Their Side Lengths



1. Complete the table. Give the area of each square in square units, and give its exact side length in units.

figure	A	B	C	D	E
area	1				
side length	1				

2. This table includes areas in square units and side lengths in units of some more squares. Complete the table.

area	9		23		89
side length		4		6.4	

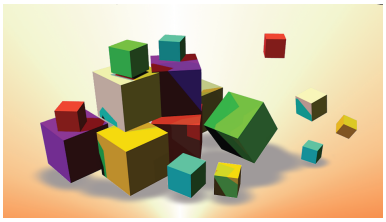
Are you ready for more?

In the first question, all of the squares have vertices at grid points.

1. Is there a square whose vertices are at grid points and whose area is 7 square units? Explain how you know.

2. Is there a square whose vertices are at grid points and whose area is 10 square units? Explain how you know.

2.3 Cube It



1. A cube an has edge length of 3 units. What is the volume of the cube?

2. A cube has an edge length of 4 units. What is the volume of the cube?

3. A cube has a volume of 8 units. What is the edge length of the cube?

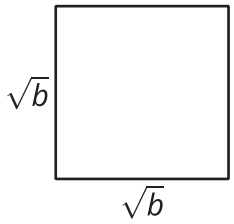
4. A cube has a volume of 7 units. What is the edge length of the cube?

5. $\sqrt[3]{1{,}200}$ is between 10 and 11 because $10^3 = 1{,}000$ and $11^3 = 1{,}331$. Determine the whole numbers that each of these cube roots lies between:

   $\sqrt[3]{5}$ $\sqrt[3]{10}$ $\sqrt[3]{50}$ $\sqrt[3]{100}$ $\sqrt[3]{500}$

Lesson 2 Summary

If a square has a side length of s, then the area is s^2. If a square has an area of A, then the side length is $\sqrt{A}$. For a positive number b, the square root of b is defined as the positive number that squares to make b, and it is written as $\sqrt{b}$. In other words, $\left(\sqrt{b}\right)^2 = b$. We can also think of $\sqrt{b}$ as a solution to the equation $x^2 = b$. This square has an area of b because its sides have length $\sqrt{b}$:



Similarly, if a cube has an edge length of s, then the volume is s^3. If a cube has a volume of V, then the edge length is $\sqrt[3]{V}$. The number $\sqrt[3]{a}$ is defined as the number that cubes to make a. In other words, $\left(\sqrt[3]{a}\right)^3 = a$. We can also think of $\sqrt[3]{a}$ as a solution to the equation $x^3 = a$. This cube has a volume of a because its sides have a length of $\sqrt[3]{a}$: