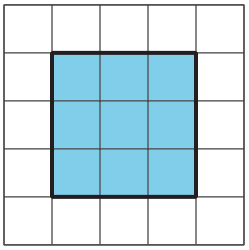
Unit 4, Lesson 11

Squares and Cubes

Let's investigate perfect squares and perfect cubes.

11.1 Perfect Squares

1. The number 9 is a "perfect square." Find four numbers that are perfect squares and two numbers that are not perfect squares.



2. A square has side length 7 in. What is its area?

3. The area of a square is 64 sq cm. What is its side length?

11.2 Building with 32 Cubes

Your teacher will give you 32 snap cubes. Use them to build the largest single cube you can. Each small cube has an edge length of 1 unit.

1. How many snap cubes did you use?

2. What is the edge length of the cube you built?

3. What is the area of each face of the built cube? Be prepared to explain your reasoning.

4. What is the volume of the built cube? Be prepared to explain your reasoning.

Are you ready for more?

Combine your 32 snap cubes with another group's 32 snap cubes. Use them to build the largest single cube you can. Each small cube has an edge length of 1 unit.

1. How many snap cubes did you use?

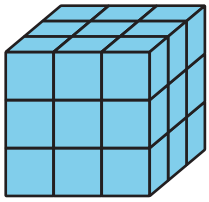
2. What is the edge length of the cube you built?

3. What is the area of each face of the built cube? Show your reasoning.

4. What is the volume of the built cube? Show your reasoning.

11.3 Perfect Cubes

1. The number 27 is a "perfect cube." Find four other numbers that are perfect cubes and two numbers that are *not* perfect cubes.



2. A cube has a side length of 4 cm. What is its volume?

3. A cube has a side length of 10 inches. What is its volume?

4. A cube has a side length of s units. What is its volume?

11.4 Introducing Exponents

Make sure to include correct units of measure as part of each answer.

1. A square has side length 10 cm. Use an **exponent** to express its area.

2. The area of a square is 7^2 sq in. What is its side length?

3. The area of a square is 81 m^2. Use an exponent to express this area.

4. A cube has edge length 5 in. Use an exponent to express its volume.

5. The volume of a cube is 6^3 cm^3. What is its edge length?

6. A cube has edge length s units. Use an exponent to write an expression for its volume.

Are you ready for more?

The number 15,625 is both a perfect square and a perfect cube. It is a perfect square because it equals 125^2. It is also a perfect cube because it equals 25^3. Find another number that is both a perfect square and a perfect cube. How many of these can you find?

Lesson 11 Summary

When we multiply two of the same numbers together, such as $5 \cdot 5$, we say that we are *squaring* the number. We can write it like this:

$$5^2$$

The raised 2 in 5^2 is called an **exponent**.

Because $5 \cdot 5 = 25$, we write $5^2 = 25$ and we say, "5 **squared** is 25."

When we multiply three of the same numbers together, such as $4 \cdot 4 \cdot 4$, we say that we are *cubing* the number. We can write it like this:

$$4^3$$

Because $4 \cdot 4 \cdot 4 = 64$, we write $4^3 = 64$ and we say, "4 **cubed** is 64."

We also use an exponent for square units and cubic units.

- A square with a side length of 5 inches has an area of 25 in^2.
- A cube with an edge length of 4 cm has a volume of 64 cm^3.

To read 25 in^2, we say "25 square inches," just like before.

The area of a square with a side length of 7 kilometers is 7^2 km^2. The volume of a cube with an edge length of 2 millimeters is 2^3 mm^3.

In general, the area of a square with a side length of s is s^2, and the volume of a cube with an edge length of s is s^3.