LESSON 3

Objective

Find the volume of a composite solid.

Common Core State Standards

- **5.MD.5c** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Measurement and Data

Volume of a Composite Solid

Students will build upon their understanding of the volume of rectangular solids by using cubic units to construct a composite solid and explore its volume. They will work with a composite solid made of two right rectangular prisms. Knowing that volume is additive, they will count and/or use the formula for volume to find the volume of each prism and add the volumes to find the volume of the composite.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *How does knowing that volume is additive help you find the volume of the box? What is the volume of the back part of the box? What is the volume of the front part? What is the total volume?*
- **Ask:** *What is another way you could have divided the box into two rectangular solids? What are the dimensions of the bottom part of the box? What are the dimensions of the top part? Is the total volume the same?*

Solve It

Reread the problem with students. Have them sketch the box and label its dimensions, and then draw a dotted line between the two parts. Have students find the volume of each part and add to find the total.

More Ideas

For other ways to teach finding the volume of a composite solid—

- Give groups of students 72 Snap Cubes® or Centimeter Cubes. Have them build four different composite solids made up of two rectangular prisms using any number of the cubes. Have them record and compare the dimensions of the composite solids, and calculate the volume of each.
- Give groups of students 72 Snap Cubes or Centimeter Cubes, but now have them use all of the cubes each time to build four different composite solids made up of two rectangular prisms. Have them record the dimensions and volume, and explain why the volume is the same each time.

Formative Assessment

Have students try the following problem.

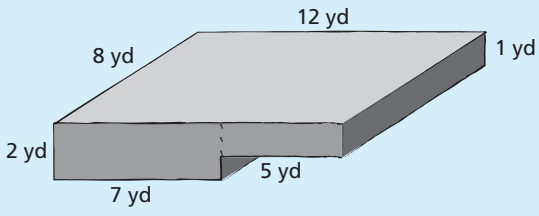
The swimming pool has a deep end and a shallow end. The dimensions of the pool are shown at right. Find the volume of the pool.

A. 208 cubic yards

B. 172 cubic yards

C. 152 cubic yards

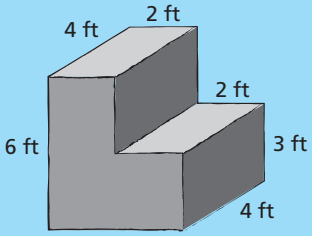
D. 115 cubic yards



Try It! 15 minutes | Groups of 4

Here is a problem about finding the volume of a composite solid.

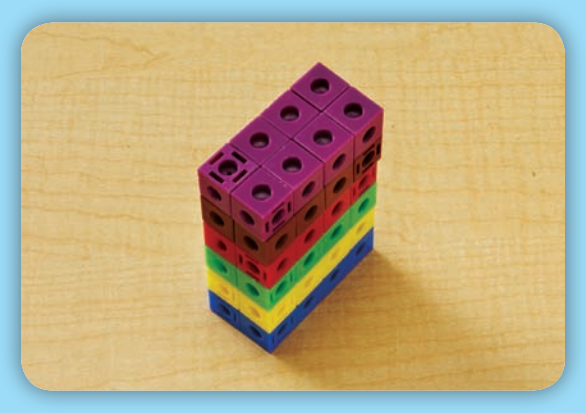
Angelo is building a shipping box in which to pack an antique writing desk with a glass cabinet top. The box he is building is shown at right. Find the volume of the box.



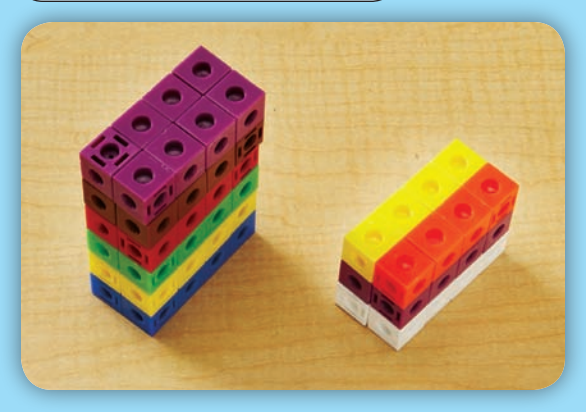
Introduce the problem. Then have students do the activity to solve the problem. Distribute Snap Cubes, paper, and pencils to students.

Materials

- Snap Cubes® (75 per group)
- paper
- pencils



1. Say: *Using cubes, build the back part of the box.* **Ask:** *What are the dimensions of the back part of the box? How many cubic units are in the back part of the box?* Have students count cubes or multiply length by width by height to find the number of cubic units.



2. Say: *Now build the front part of the box.* **Ask:** *What are the dimensions of the front part of the box? How many cubic units are in the front part of the box?* Have students count cubes or multiply to find the number of cubic units.

3. Ask: *How can we find the volume of the entire box?* Explain that to find the volume of the box, they need to add the volume of the back part to the volume of the front part. Have students add the two volumes to find the total number of cubic units.

⚠ Look Out!

Students may want to use the total width for each part instead of dividing the total width in two for the two parts. Have them draw a sketch of the box and draw a dotted line separating the two rectangular solids that make up the box, so they can clearly see the division.

Answer Key

Use Snap Cubes to model the composite solid. Find the volume of each part. Then find the total volume.

(Check students' work.)

1. Part 1: What is the height? 6

What is the width? 2

What is the depth? 3

What is the volume of Part 1? 36 cubic units

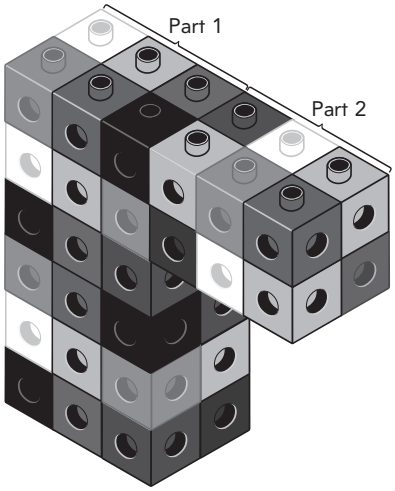
Part 2: What is the height? 2

What is the width? 2

What is the depth? 3

What is the volume of Part 2? 12 cubic units

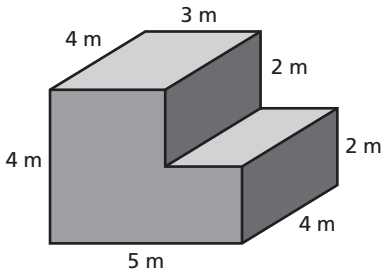
What is the total volume of the two parts? 48 cubic units



Using Snap Cubes, model the composite solid. Sketch the model. Find the volume of each part. Then find the total volume.

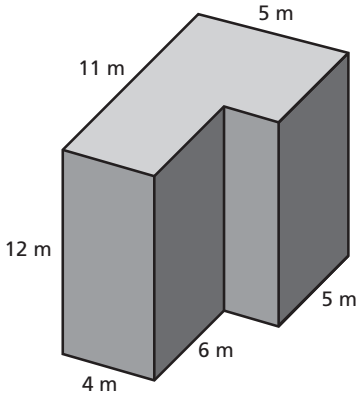
2. 40 + 24 = 64 cubic meters; or 48 + 16 = 64 cubic meters

(Check students' models.)



Find the volume of the composite solid.

3. 288 + 300 = 588 cubic meters; or 528 + 60 = 588 cubic meters.



Answer Key

Challenge! Explain why each of the composite solids in the previous problems can be divided in two different ways and how that affects the total volume.

Challenge: (Sample) Each composite solid is made of two non-overlapping right rectangular prisms that can be viewed two ways—for example, two prisms with dimensions 4 m × 6 m × 12 m and 5 m × 5 m × 12 m, or two prisms with dimensions 4 m × 11 m × 12 m and 1 m × 5 m × 12 m. The total volume is the same either way.

Name _____

Use Snap Cubes to model the composite solid. Find the volume of each part. Then find the total volume.

1. Part 1: What is the height? _____

What is the width? _____

What is the depth? _____

What is the volume of Part 1? _____

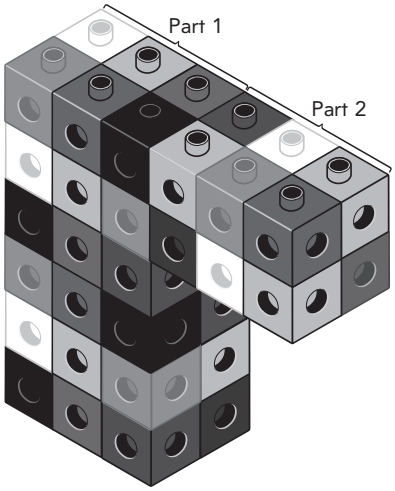
Part 2: What is the height? _____

What is the width? _____

What is the depth? _____

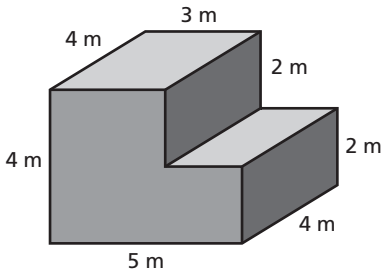
What is the volume of Part 2? _____

What is the total volume of the two parts? _____



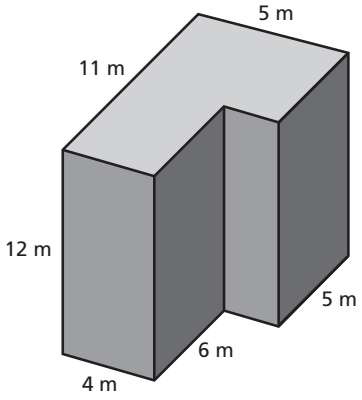
Using Snap Cubes, model the composite solid. Sketch the model. Find the volume of each part. Then find the total volume.

2. _____ + _____ = _____



Find the volume of the composite solid.

3. _____ + _____ = _____



Name _____

Challenge! Explain why each of the composite solids in the previous problems can be divided in two different ways and how that affects the total volume.