

# 1.1 How Big Are Those Boxes?

## Finding Volume



In this globalized world, people enjoy products from many different countries. The most economical way to transport goods is by water on large container ships.



The ships are loaded with individual shipping containers. The containers can be easily loaded and unloaded and then transferred to trucks for delivery. The containers themselves are also used for temporary storage in many places.



Standard shipping containers are rectangular prisms. To decide on the right container for any particular use, it is important to know the size of the things you want to store and the size of the containers available.



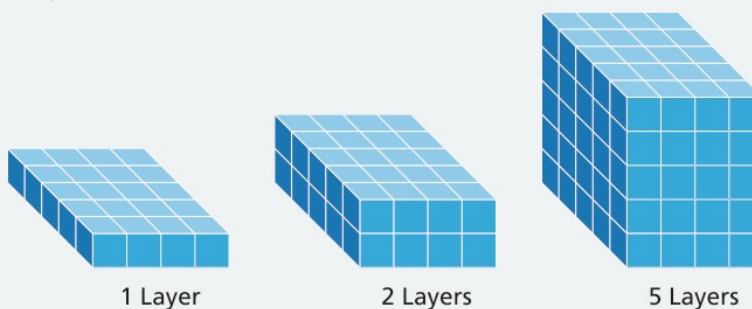
- What measurements would help you decide how you might use the container for shipping or storage?
- How can you determine the capacity of the container?

## Problem 1.1



Some students came up with this list of ways to measure a shipping container:  
(1) Length; (2) Width; (3) Height; (4) Diagonals; (5) Surface Area; and  
(6) Volume.

- A** How does each measurement 1–6 relate to the parts of the container?
- B** Match each of the possible measurements 1–6 to the questions they would help to answer. Explain your reasoning.
- How much paint would you use to paint the container in a new color?
  - Could you store a small car in the container?
  - How many sacks of rice, corn, or beans could you store in the container?
  - Could you store pipes for a farm sprinkler system in the container?
  - Could you store a long flagpole in the container?
- C** The filled shipping containers are stacked on a ship. The load is built up in layers.



- How could you calculate the number of containers in each layer of such a load?
- How could you then calculate the total number of containers in the load?
- Suppose a ship's load has 10 containers in each row from one side to the other, 15 containers in each row from front to back, and 8 layers of containers. How many containers are in the whole load?

*continued on the next page >*

### Problem 1.1 *continued*

- D** Basketballs are spheres, but they are often packaged in boxes in the shape of cubes.



1. How many of these boxes would fit into a shipping container that is 6 feet long by 5 feet wide by 4 feet high? Describe the arrangement of the boxes.
  2. What are the dimensions of some other rectangular containers that would hold the same number of basketball boxes? Describe the arrangement of the boxes in each case. Which containers make the most sense? The least sense?
  3. Suppose that your classroom is a shipping container that is a rectangular prism. How many of these basketball boxes would fit in your classroom? Describe the arrangement of the boxes.
- E**
1. Find the surface area and volume of each prism in Question C.
  2. Describe a strategy for finding volume and surface area of a rectangular prism.

**A C E** Homework starts on page 15.