1.3 Optimal Containers II

Finding the Least Surface Area

The challenge of designing inexpensive packaging also applies to many other products. To find a packaging strategy that will work for any product, it is helpful to explore different cases and look for a pattern in the results.

How would you design a rectangular box that holds a given volume but uses the least packaging material?

Problem 1.3

A For each part, do the following:

- Find the dimensions of the large boxes that require the least packaging material to enclose the given number of cube-shaped boxes for the Mug Wump characters.
- Explain your strategy and how you know you have designed the box with the least packaging material.

1. 8 cube-shaped boxes
2. 27 cube-shaped boxes
3. 12 cube-shaped boxes
4. 30 cube-shaped boxes

B Suppose you need to design a box to hold a liquid, such as juice or milk, or a material, such as rice, cake mix, or pasta. Because the contents of the box are not identical unit cubes, it is possible to consider dimensions other than whole numbers.

For each given volume, find the dimensions of the box that uses the least packaging material.

1. 1,000 cubic centimeters
2. 30 cubic centimeters
3. 500 cubic centimeters

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