MAKE A BOX

Teaching Guidelines

Subject: Mathematics

Topics: Measurement (volume)

Grades: 3 - 6

Concepts:

- Volume

Knowledge and Skills:

- Understands the commutative principle
- Can compute the volume of a rectangular prism

Materials

- a one-quart container (labeled as "1 quart") (this should be a rectangular prism, not cylindrical)
- a bin of Styrofoam "peanuts" (or a similar material, such as a "puffed rice" type of cereal)
- a collection of 30 rectangles for each of the following dimensions (a total of 180 rectangles), made from construction paper:

3 x 5	3 x 4	6 x 2
4 x 5	6 x 5	5 x 2

For each team:

- a roll of tape

Procedure:

This activity should be done in teams of two or three students. As students make boxes to match the volume of a given container, they will see that different shapes can have the same volume, and they will review the formula for computing the volume of a box.

To compare the volumes of their boxes to the volume of the quart container, students should fill the quart container with the Styrofoam peanuts and then pour its contents into their own container.

A quart container has just a little more than 60 cubic inches of volume, and there are two box sizes that will work: 3" × 4" × 5" or 6" × 5" × 2". However, in the boxes that they make, students will choose different dimensions to be the lengths, heights and widths of the boxes, and so you should end up with several of the following combinations:

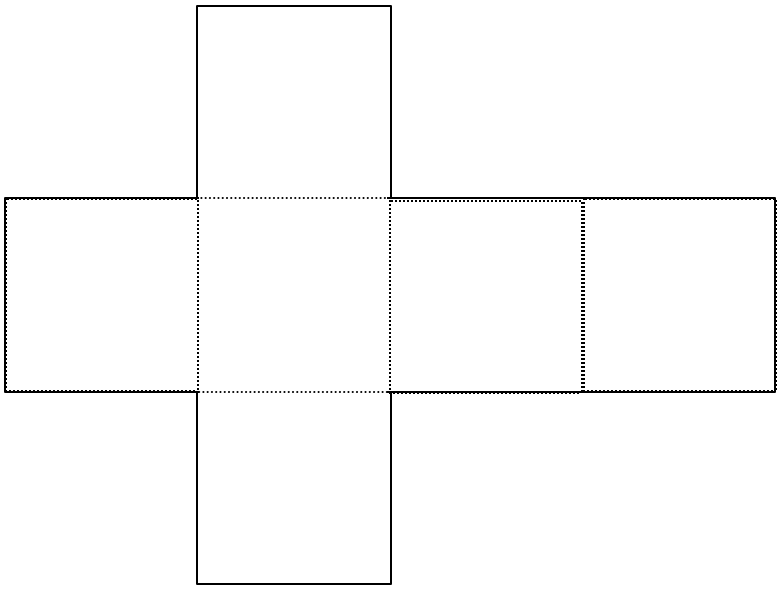
Length	Width	Height
3	4	5
4	3	5
5	3	4
5	4	3
4	5	3
3	5	4

Length	Width	Height
5	6	2
6	5	2
2	5	6
2	6	5
5	2	6
6	2	5

As students study their results table, help them to discover that it is the product of length, width and height that is the same in each case, and this is equal to the volume of their boxes: 60 cubic inches. Point out that the order in which things are multiplied does not affect the answer, and discuss whether or not it makes any difference which measurements are the length, width and height.

Make sure that students understand the concept of cubic inch: a cube with one inch sides. Explain that we use cubic inches to measure volume just like we use inches to measure length, and you could find the volume of something just by counting how many one-inch cubes would fit inside of it. (As an extension, you may wish to have students make a total of 60 one-inch cubes out of index cards using the pattern below, and count how many of them fit in the box.)

Conclude by reviewing the formula for volume of a box: length × width × height, and explain that this formula is just a quick way of finding the total number of cubic inches in the box.



Make a Box

Your teacher will show you a container. Can you make a box with the same volume as the container?

Use the rectangles that your teacher gives you. Make a box with some of them. Leave the top open. How can you find out if your box has the same volume as the teacher's container?

If your box doesn't have the same volume, make a different box. Keep trying until your box has the same volume as the container. Write down the length, width and height of your box:

Length: _____ Width: _____ Height: _____

Now make a different box that has the same volume. Write down its length, width, and height.

Length: _____ Width: _____ Height: _____

With your class, make a table that shows the length, width and height of all of the boxes that have the same volume as the teacher's container. Are all of the lengths the same? _____ Are all of the widths the same? _____ Are all of the heights the same? ____. What is the same?

_____

Explain how to find the volume of a box: _____

_____

_____

_____