Activities involving Surface Area and Volume

1. Using 2 index cards (5" x 8" work well), make two cylinders....roll one the long way and the other the short way.

Do you think they hold the same number of beans, or does one hold more?

Place the long thin one inside the squat one and fill it up with beans.

What do you think will happen when you pull the thin cylinder out and let the beans spill into the short one?

TRY IT! Are you surprised?

2. Look at a variety of cylinders. Which do you think is longer- the circumference or the height? Guess each one, then measure, using string. Another surprise?

3. Make several different rectangular structures with 24 cubes. They all have the same **volume** (24 cubic units). Do they have the same surface area?
Figure out the surface area of each structure.

Sketch each structure and write its dimensions.

If you have the same volume, will you have the same surface area?
If you have the same surface area, will you have the same volume?

4. 'Cutting Corners' to build boxes.

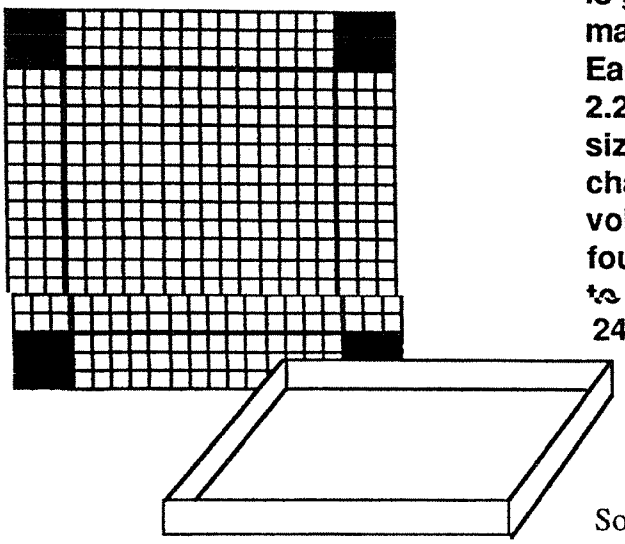
Make several boxes from a 20x20 sheet of paper. For the first box, cut out a 1x1 square from each corner, then fold up the sides, and figure out the volume.

For the next box, cut out a 2x2 square from each corner, fold up the sides and figure out the volume.

Continue making all the boxes you can. Write the dimensions and volume of each box.

5. Solve the problem: 'Filling some Planters'

As students' mathematical language develops, so does their ability to reason about the solve problems. Moreover, problems-solving situations provide a setting for the development and extension of communication skills and reasoning ability. The following problem illustrates how students might share their approaches in solving problems:



The class is divided into small groups. Each group is given square pieces of grid paper and asked to make boxes by cutting out pieces from the corners. Each group is given 20 X 20 grid paper. See figure 2.2. Students cut and fold the paper to make boxes sized 18 X18 X1, 16 X 16 X 2,..., 2 X 2 X 8. They are challenged to find a box that holds the maximum volume and convince someone else that they have found the maximum. Groups are encouraged also to explore other grid sizes, such as 19 X 19 or 24 X 24.

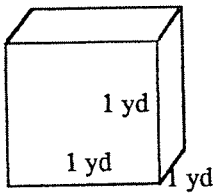
Some groups might decide not to limit themselves to boxes that are cut on the lines. Others might make a graph of the volume as compared to the height of the box. One group might decide to see what happens when they use the scraps left over from the corners. In a class discussion, students share their explicit findings, from which they eventually extrapolate generalizations. Students recognize that their solutions depend on the way in which they define the problem. These kinds of explorations provide opportunities for students to write about their ideas and the generalizations they have made.

Teachers' questioning techniques should help students construct connections among concepts, procedures, and approaches. Questions that limit answers to recitation of a single number, a simple yes or no, or a memorized procedure do not teach students the communication skills they will need.

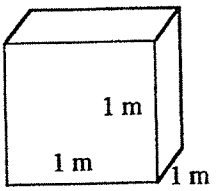
NCTM, Standards

Filling Some Planters

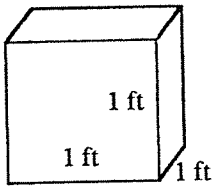
a. How many cubic feet of gravel are there in a a cubic yard?



b. How many cubic centimeters of compost are there in a cubic centimeter? (There are 100 centimeters in a meter.)



c. How many cubic inches of soil are there in a cubic foot?



Suppose you have three window boxes that are each 28 inches wide by 9 inches deep. You need to fill them with soil to a height of 6 inches.

d. How much Ferti-Soil do you need to buy?

e. How much will it cost?

e. How much do you save by buying the large size?

Ferti-Soil

Ready to use! – a complete growing medium for indoor or outdoor use.Steam sterilized.

6^{79} 2 Cu. Ft.

3^{79} 1 Cu. Ft.