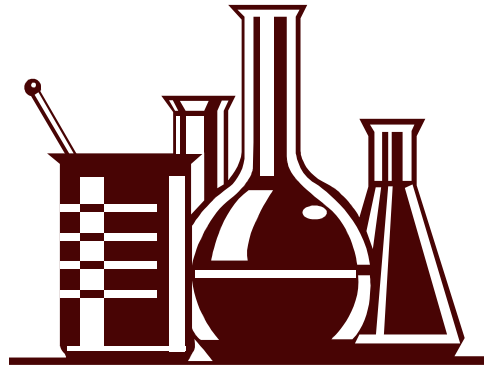


Algebra and Geometry Institute Summer 2006  
Faculty Name: Maxine Williams  
School: Bell Elementary / Boyle, Ms  
Grade Level: 4



## Cubic Unit Models

### 1 Teaching Objective(s)

The student will count number of cubic units in a given figure and construct figures to find specific volume. (3c)

The student will explore and model the dimensions of geometric solids. (3b)

*Note: Before class begins place a container of about 300 cubes on each table.*

### 2 Instructional Activities

Bell- Ringer: Is the problem of the Day. It is an important activity that should take place everyday. “Who would like to read the problem of the Day?”

-Ask a student to read the problem.

-Before class begins copy Problem of the Day onto a transparency to show during the discussion.

-Problem of the Day: Use centimeter cubes. Design the tallest building you can with a total of 10 cubes and a first floor of 3 cubes.

-Allow time for students to respond to problem. “Who would like to tell how to find the answer?” “Does anyone know a different way to find the answer?”

-Write the answer below the problem.

A “skyscraper” with a base of 3 cubes and a stack of 7 cubes atop one of the base cubes.

After discussing the bell-ringer, say: Last time we learned about plane shapes.

Today we are going to learn about solids. We will also learn what formula we can use to compute the volume of a rectangular solid.( multiply length of base x height x width of base) We will use cubes to model and determine the volume of rectangular solid. (6 minutes)

#### Activity 1: Volume Model (33 minutes)

Divide students into groups of 3. Students will use spinners to determine the length of base, height, and width of base of solids.

Then students will construct these shapes. One person spins 1 time for the length of base. Player 2 spins for the height of the structure. Player 3 spins for the width of base. Then count the number of cubes in the structure. This is the volume. Record your base length, height, width and volume in a table. Repeat all steps above. Each person will spin at least 3 times. See attachment #1 and #2

### **Activity 2: Create- a - Model**

Students will form a complete circle around the room. This activity will reinforce the lessons on volume. One volunteer will start the game off by throwing a large rubber cube (1-6) to anyone in the circle he/she chooses. Another volunteer will record the dimensions on the chalkboard. The player who catches the cube will pick the number showing to get length of the base. Then repeat steps with the height, and the width of base. The fourth person to catch the cube will compute the volume. Continue until everyone has taken a turn. Divide students into 2 groups to repeat the game. Students may pass at least once if the cube is thrown to them.

### **Activity 3: Volume Model**

Instruct students to read the Activity sheet on volume (See attachment # 3). Divide students into groups. Ask a representative from each group to present their models. Check solutions as students present results.

**Post-game- discussion:** Ask students to study their answers and information from the activities. Then have students use the information from the dimensions table to develop the algorithm to find the volume of rectangular solids. Student will do this independently. (6 minutes)

## **3 Materials and Resources**

### **Materials**

- 6 spinners
- 2 large rubber cubes (1-6)
- 300 cm cubes
- popcorn
- cm rulers/ table to record
- large pieces of paper (20cm x 25 cm)
- tape
- scissors
- overhead projector

### **Resources:**

Adapted from Hands-On Measurement Grade 3-8 ( Hands-On, Inc., 1981).  
*Arithmetic Teacher* volume 7 (National Council of Teachers of Mathematics, 1981)

## **4 Assessment:**

- a. Observe student participation and work during each game activity and during post- game discussion.
- b. Grade information on the dimensions table.

## Activity Sheet: Cubic Unit Volume Model

Materials: Spinners (6) and cubes (4cm)

Organization: Groups of 3

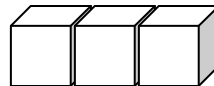
### Procedure:

Students will use spinners to determine the length of the base, height, and width of base for solids and then construct these solids. Player 1 will spin the spinner and this will be the length of the base of the figure. The student should construct this part of the figure. Player 2 spins and constructs the height of the figure. Player 3 spins and constructs the width of the figure. Once the figure is constructed, students can count the number of cubes in the figure. Then ask, “can you find a way to find the volume without counting cubes?” Students will record this information in a table. See attachment # 2.

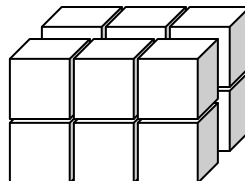
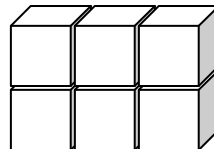
Also reinforce that the volume is made up of cubes and that the volume must be labeled “cubic units.”

Player one/length of base

Player two/height of structure



Player three/width of base



**Dimensions Table**

	Length (of base)	Height	Width (of base)	Volume
Structure #1				
Structure #2				
Structure #3				

What formula can we use to compute the volume of a rectangular solid?

---

## **Activity Sheet: Volume Model**

Organization: Small cooperative group

Materials: 20cm x 25cm paper  
tape  
scissors  
popcorn

Procedure:

Students find volume using cylinders.

- Have students cut two pieces of paper 20 cm x 25 cm.
- Roll each sheet to form 2 different cylinders – one 20 cm tall and the other 25 cm tall. .
- Tape the edges together and stand them on a flat surface.
- Have students predict which cylinder will hold the most popcorn.
- Fill only one cylinder with popcorn and take it and pour it into the empty cylinder.
- What conclusion did you arrive at during this activity?

Note: This lesson will lead to a later discussion on surface area of solids.