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

VOLUME OF A CUBE

Teaching Objective(s)

Finding the volume of a cube and identifying cubing a number.

Instructional Activities

The teacher will write the objectives on the chalkboard:
-Today we will learn:
How to find the volume of a cube.
How to identify perfect cubes.

"I will give everyone a large plastic cube (4cm) and a small plastic cube (1cm)."
"Use the centimeter side of your ruler to measure the length of each edge of the small plastic cube."

-Give each child a centimeter cube, a ruler, and a large plastic cube.
"How long is each edge of the small plastic cube?   1 cm
"Because each edge is one centimeter, we call this a cubic centimeter."
"We write 'one cubic centimeter = 1 cm^3
"Now look at your large plastic cube. How many cubic centimeter cubes do you think you will need to make a solid cube that is the same size as your large cube?"

-Write the children's estimates on the chalkboard.
"Let's find how many cubic centimeters it will take to make a solid cube that is the same size as your large plastic cube. You will work with a partner to do this."

-Seat children in groups of 3. Give each group a container of about 150 centimeter cubes.
"Work with your partner to make a solid cube that is the same size as the large plastic cube."

-Circulate and assist the children as they work. When all children finish, continue.
"How long is each edge of your cube?" 4 cm
"The length, width, and height of a cube are called its 'dimensions."
"The dimensions are four centimeters long ,four centimeters wide, and four centimeters high."

- Write the following on the chalkboard: 4 cm x 4cm x 4 cm
"How many cubic centimeters are in the bottom layer of your cube?" 16
"How many layers do we have?" 4
"There are four layers of sixteen cubes. How many cubic centimeters are there in four layers of sixteen cube ?" 64
"We used sixty-four cubic centimeters to make this larger cube."

-Write the following on the chalkboard: 4 cm x 4 cm x 4 cm = 64 cm^3
"How many cubic centimeters are in the bottom layer of your cube?" 16
"How many layers do we have?" 4
"There are four layers of sixteen cubes. How many cubic centimeters are there in four layers of sixteen cubes?" 64
"We used sixty-four cubic centimeters to make this larger cube."
-Write the following on the chalkboard: 4 cm x 4 cm x 4 cm x 4cm = 64 cm^3
"We call this the volume of the cube."

"Volume is the number of centimeter cubes we would need to use to fill the large cube. Show some teacher made cut out pictures of cubes from a magazine or newspaper.
"Which picture matches the cube we just made?"
"How long is each side?" 4 cm
"Label the length, width, and height of this cube."
-Allow time for students to respond to each question.
"How did we find the number of cubic centimeters we used to make a four-centimeter cube?"
-Point to the equation 64 cm ^{3} on the chalkboard.
Repeat directions for two-centimeter (using the pictures of the different size cubes.)
"Put your cubes in the container."

"When we find the volume of a cube, we multiply the length of an edge times itself three times."

" When we use a number as a factor three times in finding a product
how do you think we will write 'five cubed'."

-Write "5^3 on the chalkboard.

 What is the answer?" 125

"What do we call the small, raised number next to the number?" exponent

"An exponent tells how many times a number is used as a factor in finding a product.
Repeat directions for four, seven and nine cubed.

-Write the following cubes on the chalkboard. (Do not fill in the answers at this time.)
Complete with cubes 4-10.

$1^3 =$_____ $3^3=$_____ $2^3=$_____

 "Work with your partners to find the answers for the perfect cubes."

"Who would like to share with us something you learned today during our math lesson?"

For enrichment students will do an activity on finding volume using cylinders.
Activity sheet is attached:

Materials and Resources

 Paper 20 cm x 25 cm
 Popcorn
 6 large plastic or rubber cubes 4cm x 4 cm x 4cm
 150 cm cubes
 Pictures of different sizes cubes
 Tape/ scissors

Reference(s) Perzanodki, Tommy, Lynne O' Neal , and Kathy Corcoran. " Math 4
            Incremental Development, Saxon Publishers, Inc. (2001).
            Arithmetic Teacher, Volume 28, Number 7, copyright 1981 by the National
            Council of Teachers of Mathematics.

Assessment: Observe student participation and work on finding volume and identifying perfect cubes.

Written Assessment: (2 pts each)   Simplify

$4^3 =$ _____   ( )

$8^3 =$ _____   ( )

$1^3 =$ _____   ( )

$6^3 =$ _____   ( )

Activity Sheet : Volume

Procedure:
Students find volume using cylinders.

Organization: Small cooperative group.

Materials: 20 x 25 cm paper
            tape
            scissors
            popcorn

-Have students cut two pieces of paper 20 cm x 25.
-Roll each sheet to form a cylinder, one 20 cm high and the other 25 cm high.
-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.