Algebra/Geometry Institute Summer 2006

Volume of a Cylinder

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Grade Level: 7

1. Teaching objectives
Calculate and compare the volume of cylinders.

2. Instructional Activities
    - Tell the students, "Today we are going to learn how to find the volume of cylinders."
    - Remind the students that a cylinder is a solid figure that has two circular bases.   The bases are congruent and parallel.
    - Remind the students that the volume of a cylinder is the amount of space inside the cylinder. Volume is measured in cubic units.
    - Tell the students that volume of a cylinder is found by multiplying the number of cubic units needed to cover one layer by the number of layers.
        o Show the students a cylinder.
        o Measure the diameter of the cylinder and calculate the radius.
        o Measure the height of the cylinder.
        o Write the formula $V = \pi \times r^2 \times h$ on the board.
        o Explain that $\pi \times r^2$ finds the area of the circular base and h is the height of the cylinder.
        o Calculate the area using the data gathered about the cylinder.
    - Write the following problem on the board, "Find the volume of a cylinder with a diameter of 6 inches and a height of 4 inches."
        o Draw an example of the cylinder.
        o Write the formula $V = \pi \times r^2 \times h$ on the board.
        o Ask the students, "What information can we plug into the formula?"
        o Elicit the response that $h = 4$ inches.
        o Discuss with the students that the radius is half of the diameter.
        o Elicit the response that $r = 3$ inches.
        o Using a calculator plug in $\pi \times 3^2 \times 4$. The volume of the cylinder is about 113 cubic inches.
    - Hand out activity sheet "Volume." (Attachment 1)
        o Tell the students to take out two sheets of 8.5"$\times$11" pieces of paper.
        o Instruct the students to curl one piece of paper to form a cylinder 11" tall. Use a piece of tape and carefully join the edges the cylinder. No paper should overlap.

- o Instruct the student to curl the other piece of paper to form a cylinder 8.5" tall. Use a piece of tape and carefully join the edges the cylinder. No paper should overlap.
- Instruct the students to predict if the cylinders will have the same volume and if not which one will have the greatest volume.
  - o Tell the students to complete predictions on number 1 of the activity sheet.
- Pair the students and give each group a bag of centimeter cubes.
  - o Instruct the students to place the cylinders upright on the table. The table should form the bottom.
  - o Instruct the students to fill the cylinders with centimeter cubes.
  - o Instruct students to record results on the activity sheet.
- Ask the students, "Do the cylinders have the same volume?"
  - o Elicit the response that the 8.5" cylinder has a larger volume.
- Ask the students to explain why or why not they have the same volume.
  - o Elicit the response the difference is caused by the difference in radii.
- Instruct the students to complete the chart at the bottom of the activity sheet.
  - o Go over the answers with the students.

3. Materials and Resources
Activity Sheet
Pencil
Board
Marker
Calculator
Centimeter cubes
Two sheet of 8.5"X11" paper
Tape
Teacher's Resource Math on Call. Great Source Education Group. 1999.

4. Assessment
- The teacher will observe students as they work in their groups.
- The concept will be covered on the next chapter test.

Volume

Directions: Take two sheets of 8.5" X 11" paper and curl one of them to form a cylinder 11' tall. Take the other sheet and curl it to form a cylinder 8.5" tall. Take a piece of tape and carefully join the edges of each cylinder. There should be no paper overlapping. Examine the two cylinders and predict if they will have the same or different volumes.

Predictions:
1. Which cylinder has the greater volume the 8.5" or the 11"?
    _____

Directions: Place the two cylinders upright on the table, so that the table forms the bottom on the cylinder. Fill each of the cylinders with centimeter cubes. Count the number of centimeters it takes to fill the cylinder.

2. Volume of the 11" cylinder. _____

3. Volume of the 8.5" cylinder. _____

4. Do the cylinders have the same volume?
    _____

5. Explain why or why not.
    _____

Practice

Directions: Complete the following chart.

$$Volume = \pi \times r^2 \times h$$

Cylinder	Radius	Diameter	Height	Volume
1	2"		7"	
2	5.2"		9"	
3		12"	24"	
4		20"	33"	