

Fill 'Er Up

Question: What is the relationship between actual liquid volume and measured/computed volume?

Kentucky Core Content:

MA-M-2.2.5 Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: Use formulas to find area and perimeter of triangles and quadrilaterals, area and circumference of circles, and surface area and volume of rectangular prisms

MA-M-2.1.3 Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: Common three-dimensional shapes including spheres, cones, cylinders, prisms (with polygonal bases), and pyramids (with polygonal bases)

MA-M-2.1.4 Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: Congruence, symmetry, and similarity

Objectives:

Students will be able to:

1. Explain that a cubic centimeter is equal to one milliliter.
2. Explain that the formulas given for computing volume correspond with actual measurements.

Materials:

Per pair of students

- Rulers or measuring tape
- Several hollow geometric solids
- Pencil
- Paper
- Calculator
- Graduated cylinder
- Beaker or empty container
- At least one of the following: water, rice, or sand

Procedure/Time:

This activity will take one and a half to two class periods.

1. The teacher should begin by writing the formulas for finding the volume of the geometric solids on the board.
2. Each pair of students should be given at least one solid, a graduated cylinder, ruler or measuring tape, beaker or other container, and a supply of water/rice/sand.
3. Next, have students fill their solid with water/rice/sand. Once the solid is filled completely, students should pour the contents into the graduated cylinder to find the actual volume of the solid. Have the students record this on their paper.
4. Students take the measurements they need in order to find the volume. After doing so, have the students use the calculators to determine the computed volume of their solids and record this on their paper as well.

5. Have students compare the computed volume and the actual volume. If the difference is more than .5mL, have the student repeat the procedure. Students should then trade solids and repeat the process as many times as time allows.

Assessment

Students will be assessed on their calculations from the activity and an informal in-class discussion after the activity.

Teacher Notes: Teachers can set their own limits on the difference between computed volume and actual volume. Smaller solids might require a smaller acceptable difference. Be sure that students take the internal measurements of the solid. Any thickness of the solid should not be included in the measurements as that will alter the computed volume. Have students discuss the differences they had in calculated volumes of the solids and discuss why this might be so. Larger solids may hold too much water/rice/sand for one graduated cylinder. Have students find a way around this problem without using multiple graduated cylinders.