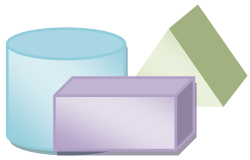


PRACTICE TASK: Super Solids

STANDARDS FOR MATHEMATICAL CONTENT

MCC5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole- number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

STANDARDS FOR MATHEMATICAL PRACTICE

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

BACKGROUND KNOWLEDGE

Students should realize that square units represent 2-dimensional objects and have both length and width, while cubic units represent 3-dimensional objects and have length, width, and height.

Students should have had experiences with the attributes of rectangular prisms, such as faces, edges, and vertices, in fourth grade. This task will build upon this understanding.

The general formula for the area of a parallelogram is $A = bh$. Knowing the general formula for the area of a parallelogram enables students to memorize ONE formula for the area of rectangles, squares, and parallelograms since each of these shapes is a parallelogram.

The general formula for the volume of a prism is $V = Bh$, where B is the area of the BASE of the prism and h is the height of the prism. Knowing the general formula for the volume of a

prism prevents students from having to memorize different formulas for each of the types of prisms they encounter.

Common Misconceptions:

Students need to be encouraged to estimate the volume based on the information they have, but not actually calculating the answer. Estimating is not the same as guessing and students need to know that there are strategies involved in estimating. They need to be encouraged to share their strategies with each other.

ESSENTIAL QUESTIONS

- How can you find the volume of cubes and rectangular prisms?
- Why is volume represented with cubic units?
- What connection can you make between the volumes of geometric solids?
- How do we measure volume?

MATERIALS

- Empty boxes (such as shoe, cereal, cracker, etc.)
- Centimeter cubes
- Rulers or measuring tapes
- "Super Solids" task sheet

GROUPING

Partner/Small Group Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will estimate and find the volume of real-world objects.

Comments

For each object, students will estimate the number of centimeter cubes that will be needed completely fill the box. (They should NOT fill the box with centimeter cubes to estimate.) After all estimates have been recorded, students will use their measurement tools to determine the volume of each box. All measurements should be to the nearest tenth of a centimeter.

After students have found the volume of each box, compare results. Discuss any discrepancies. Allow pairs of students to share their strategies for making their estimate and determining the volume.

Task Directions

Students will follow the directions below from the "Super Solids" student recording sheet. Objects to measure could include tissue box, storage tubs, lunch box, waste basket, storage area of desk, etc.

For each object you choose, estimate the number of centimeter cubes that will be needed to completely fill the box. Once you have recorded your estimate, measure the object to determine the volume of each box.

∗All measurements should be recorded to the nearest tenth of a centimeter.

Object	Estimate in cm^3	Area of Base $A = b \times h$	Height of Prism	Volume of Prism in cm^3 $A = B \times h$

FORMATIVE ASSESSMENT QUESTIONS

- How did you find your estimate for the volume of your rectangular prism?
- How did you find the area of the base of your prism?
- How did you find the volume of your prism?
- What is — × —? What is 0.1 × 0.1? Where should you place your decimal in your answer? How do you know? (Students should recognize that — × — = —— and that —— × — = ———. Therefore, 0.1 × 0.1 = 0.01 and 0.01 × 0.1 = 0.001.

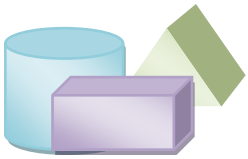
DIFFERENTIATION

Extension

- Students can calculate the area of each surface of the solid and determine the total surface area.

Intervention

- Encourage students to fill their boxes with centimeter cubes. This allows students to use models when determining volume.



Name_____ Date_____

Super Solids

For each object you choose, estimate the number of centimeter cubes that will be needed to completely fill the box. Once you have recorded your estimate, measure the object to determine the volume of each box. *All measurements should be recorded to the nearest tenth of a centimeter.

Object	Estimate in cm^3	Area of Base $A = b \times h$	Height of Prism	Volume of Prism in cm^3 $A = B \times h$